THE ENGINEERING AND MINING JOURNAL

Graphite in New York.*

BY DAVID H. NEWLAND.

Graphite is widely distributed through the metamorphic rocks of the Adirondacks, but, so far, active mining operations have been confined to a few localities. The most productive region is in the vicinity of Lake George, in Warren and Washington counties. Deposits of crystalline graphite have been exploited there for a long time, and they continue to yield the greater part of the high-grade material produced in the United States.

The graphite occurs in small veins and dikes intersecting the metamorphic strata, and in the form of thin crystals or scales disseminated through quartzites, schists and limestones. The veins are, perhaps, the richest of the deposits, though they rarely, if ever, occur in sufficient size to be valuable. The graphite is found in leaves and larger masses, more or less admixed with quartz, but otherwise free from impurities. These deposits bear some resemblance to the dikes, which also yield a coarsely crystalline product associated with feldspar, quartz and other minerals common to pegmatite. The only successful attempt at working a dike has been at Chilson hill, near Ticonderoga, where operations were carried on for several years by the Joseph Dixon Crucible Company. As a rule, there is little regularity in the occurrence of pegmatite deposits, and this fact detracts from their value as mining propositions.

The graphitic quartzites, schists and limestones, while not so rich as the veins and dikes, are more persistent and can be worked on a larger scale. At present they are the basis of all active operations in the State. The graphite occurs in finely divided particles disseminated throughout the rock mass; its recovery is a matter of some difficulty, since the rock must be crushed to such a size that the graphite is released and then subjected to a concentration which is the reverse of the process usually followed in separating ores from gangue, in this case the lighter mineral being the valuable one. The difficulty is greatly increased if the graphite is accompanied by other scaly minerals, like those of the mica group.

The most successful graphite mine in the Adirondacks is that worked by the Joseph Dixon Crucible Company, in the town of Hague, five miles west of Lake George. The deposit consists of a bedded quartzite associated with the schists and gneisses of that region. It is of great extent and for several years has supplied almost the entire product of the State. The company operates two mills for the separation and refining of the graphite, one situated at the mine and the other at Hague. An interesting feature of the concentration process at the latter place is the use of the Hooper air jig, which has been found to be well adapted for treating graphitic rocks of this character.

Aside from the operations of this company there was little graphite produced in New York during 1904. The mine and works of the Adirondacks Mining and Milling Company on South bay, near Dresden, were inoperative for most of the year, as were also those owned by the Ticonderoga Graphite Company. The latter concern has been taken over by the Columbia Graphite Company, of Pittsburg. Pa. Its mines are situated near Rock pond, between Ticonderoga and Shroon, where there is a mill equipped with stamps and buddles. In character the deposit resembles the graphitic quartzite of Hague, but it is of larger size and somewhat lower in grade.

A new undertaking is the Champlain Graphite Company, which was organized late in 1904 to develop a deposit of graphitic schist near Whitehall. A mill is now under course of construction. The Silver Leaf Graphite Company of the same place did not engage in productive operations during the year.

Some attempts to mine graphite have been made on the opposite side of the Adirondacks, in St. Lawrence county. Both veins and disseminated deposits occur there in association with crystalline schists. Some development work was done last year on a prospect near Pope Mills, in the town of Macomb. The graphite occurs as fine scales in schist and the deposit is said to be extensive. About 500 tons of rock have been taken out and a mill has recently been completed.

The production of crystalline graphite from New York mines in 1904 was 3,132,927 lb., valued at $119,509. There was little change in the output compared with previous years. The International Acheson Graphite Company, of Niagara Falls, reported a production of 3,248,000 lb. of artificial graphite valued at $217,790.

*From *Bulletin* No. 93, New York State Museum, 1905.

Anson G. Betts, of Troy, N. Y., proposes (United States Patent 791,401, May 30, 1905) to extract zinc from its ores by first obtaining the metal as a soluble salt, such as zinc sulphate, in solution, the latter being then electrolyzed, using a liquid-metal cathode, such as mercury, in order to produce a zinc-mercury alloy. The zinc is extracted from the alloy, using a solution of zinc chloride as the electrolyte.

After an exhaustive study of the possibility of obtaining copper by the electrolysis of fused cuprous sulphide, G. Bodländer came to the conclusion (*Zeit. f. Electrochem.*, 1905, XI, 161-182) that the practical deposition of copper from that electrolyte, either alone or in mixture with alkali sulphides, is hopeless.

Gold Extraction by Cyanide: a Retrospect.*

BY JOHN S. MACARTHUR.

The circumstances which led to the invention of the cyanide process were these:

About midsummer of 1886 the Cassel process of gold extraction, by the solvent action of electrolytically generated chlorine, was attracting attention. The process was at the stage of large-scale testing, with works in London under the charge of the inventor, H. R. Cassel, when suddenly circumstances compelled him to abandon his post, leaving the affairs of the Cassel Gold Extracting Company in great confusion.

Having had occasion to look critically into this process, and in course of writing an article on the subject for a weekly journal, I came to the conclusion that the same result could be accomplished without the electric current and without nascency, by the use of chlorine or bromine in presence of a salt which (a) would not absorb chlorine or bromine, (b) would not precipitate gold, (c) would precipitate base metal compounds.

Perhaps there is no salt that absolutely fulfils these conditions, but bleaching powder and borax and bicarbonate of soda approximate to it. I proved that chlorine and bromine, along with such salts, did dissolve gold, but the action on pyritic and base-metal compounds was less easy of proof. At any rate, this method was tried on a sample of gold ore with such success that a research syndicate, consisting of Dr. R. W. Forrest, Dr. W. Forrest, Mr. Geo. Morton and myself, was formed to investigate and, if possible, develop the process into a commercial success; but we failed in this, for again the halogen, notwithstanding the moderating effect of the added salts, worked too vigorously and spent its expensive energy on the base metals, and to our disgust neglected the gold.

At this juncture, the directors of the Cassel Gold Extracting Company requested me to perfect the Cassel process, and the arrangement was completed on the footing that the Cassel Gold Extracting Company should have the first right to acquire any discovery which might result from the efforts of the MacArthur-Forrest Research Syndicate.

We soon found that our sub-alkaline halogen solution was not to be effective; but, encouraged by the confidence of our far-seeing financial partner, we continued our researches to find a gold solvent that would not be a base-metal solvent. Naturally this excluded all reagents of the aqua-regia type, and restricted us to solutions alkaline to test paper, or at least neutral.

Having regard to the many who, like ourselves, were then searching for a pro-

*Abstract of a paper read before the Scottish Section, Society of Chemical Industry, March 7, 1905. *Jour.* Soc. Chem. Ind., April 15, 1905.

cess of extraction, and to the fact that results were frequently reported from the difference between original assay value of the ore and final assay value of the residue —a method frequently open to grave objection—we decided not to consider as extracted any gold unless we actually handled and weighed it. As the most generally useful and applicable precipitant of gold we used sulphureted hydrogen.

Among the various solvents on our program for trial, we had included potassium cyanide; in November, 1886, we tried the effect of it on the tailing of one of the Indian gold mines, and, as usual, treated the solution with sulphureted hydrogen for recovery of the gold, getting none, we passed on to our next solvent, meanwhile observing our rule of labelling the residue and laying it aside. We had neglected to notice that sulphureted hydrogen did not precipitate gold from its solution in cyanide, and thus our experiment was, for the time, literally relegated to the shelf.

About eleven months afterward, I had occasion to devise a rapid method of gauging approximately the gold content in weak solutions of gold chloride, and used for the purpose tin chloride to produce the well-known purple of Cassius. One solution that I had to test contained mercury, and, using potassium cyanide to separate the mercury and the gold, I was apprised of the fact that sulphureted hydrogen did not precipitate gold from its cyanide solution. Instantly my mind reverted to the experiment carried out nearly a year before, and I saw that it might have been successful without the success being recognized. Immediately a sample of rich concentrate from a California mine was treated, and on this occasion we examined the residue rather than the solution, and found a high percentage of extraction. A sample of poor concentrate from India was then treated, and again a high extraction was obtained.

The results were startling. We unearthed the residues from the old experiments (all our work was done in duplicate) and to our intense satisfaction we found that they, too, had transferred their gold to the cyanide solution. There was then no doubt about the importance of the discovery, and at once a provisional specification was drafted and lodged. The guidance on this subject to be obtained from chemical and technical text books was scanty, meager and sometimes misleading. We could get no information whatever on the action of cyanide solutions on gold ore, and no direct or useful information as to the action of cyanide on the ores of base metals. We did get, however, some information regarding the action of cyanide solutions on the metals themselves.

Amid all the confusion of authority, we had to work out a metallurgical process rather than attempt to solve delicate chemical questions concerning reactions among pure materials. On the general assumption that the addition of oxygen, or at least air contact, was necessary for the chemical action, we constructed our first apparatus with a wonderful arrangement of ploughshares which turned the ore, sloppy with cyanide solution, over and over, always exposing fresh surfaces to the air. This apparatus gave such good results that we tried the simplification of plain stirring, which also did well, and we came down to a revolving barrel, which did equally well. After this we came down to a plain percolation of the cyanide solution through the ore, which gave such satisfactory results that we concluded that, even if air contact or oxygen were necessary, it was not necessary to devise any special form of apparatus to introduce air to the mixed ore and cyanide solution.

So far, we had dealt with the problem of getting the gold into solution, which was by far the most difficult part of the question. The precipitation from solution was comparatively easy. We knew well that zinc precipitated gold from its cyanide solution; but it remained to make this reaction industrially applicable. We used various forms of finely divided zinc with more or less advantage; but a picture of some fine zinc shavings, bought with other things in a shilling box of chemicals in my boyish days, haunted my mind, and repeatedly I described it to one of the works foremen without effect, until one day, when making a zinc case for packing cyanide, he made a shaving by a sharp tool and asked me if that was what I wanted. My reply was, "Yes," and in half an hour he had prepared the first bundle of zinc shavings for gold precipitation.

We had, of course, to design an apparatus for using the zinc. Here the difficulties of small-scale work hampered us seriously. It seemed such an easy matter to put the zinc in a jar with a hole at the bottom and allow the gold-cyanide solution to run through it; and this simple scheme did very well for a few hours; but gradually the interstices in the zinc mass became choked with extremely fine precipitated gold, the solution flowed more and more slowly, till finally the zinc mass became impervious and the solution overflowed. A small tank, really a watertight box, with compartments arranged for the well-known alternate up-flow and down-flow, was used; but the down-flow compartments, did not work satisfactorily. Finally the form now in use, in which the down-flow is through zincless compartments and the up-flow through zincful compartments was devised in its first form by the metallurgists then in charge of the MacArthur-Forrest installation in New Zealand.

Zinc precipitation is one of the weak points in the process. With care, the precipitation is complete to a few grains per ton, but the gold is collected in such fine mud, drying into dust, that loss is inevitable. Various modifications have been suggested in the method of precipitation, to avoid this and other inconveniences. Zinc itself has been used in the form of a fine dust which was mixed with the cyanide-gold solution into almost an emulsion. The gold was quickly precipitated and the gold precipitate with a large excess of zinc allowed to settle, and was then collected. This, however, did not get over the trouble of the gold being in soot-like dust, liable to loss with each breath of wind. This method was worked in conjunction with the cyanogen-bromide modification of the cyanide process by Messrs. Sulman and Teed.

When solutions are very weak in free cyanide, or when they contain copper, they are not easily precipitated by zinc in the ordinary manner (though the difficulty in weak solutions has been greatly exaggerated); but this difficulty has been overcome by using zinc coated over with precipitated lead. This is carried out by adding a small quantity of a lead salt to the gold-cyanide solution as it enters the zinc box. This method was devised by me, and patented in 1894. The application for a patent in the Transvaal was refused on an objection lodged on behalf of the Chamber of Mines—thus the process dropped out of sight in the Transvaal until 1898, when it was rediscovered by Betty, who worked it successfully. The introduction of the lead-coated zinc had much to do with the desertion of the electro-precipitation process.

It is not easy to enumerate the advantages conferred on the gold industry and on the world generally by the cyanide process. It adds directly to the world's output of gold about 20%, and indirectly very much more, because of greater profit accruing to the cyanide operations, which permits mining and mill amalgamation to be carried on in conjunction with them where they would not have yielded enough profit to stand alone. In fact, in many cases where ordinary milling would not recover enough gold to pay for itself and for mining, cyanide steps in, recovers another moiety of gold at a cheap rate, and makes a profit for the complete chain of operations. Thus, an industry of the two stages of mining and milling might not be able to exist where, with cyanidation added, the industry obtained a new lease of life. Speaking generally, this may be said to be the case in South Africa. If cyanide were to be withdrawn from the Rand, the huge gold industry now so firmly established would dwindle and in many individual cases die. This is true, in degree at least, of many goldfields.

It is stated that the capacity of the pipe-line from the Indian Territory to Whiting, Indiana, which was opened July 17, is 18,000 bbl. per day. It will take 150,000 bbl. of oil to fill the pipe. In addition to that there is tankage along the line for about 70,000 bbl. of oil.

Check Valves for Blowers and Blast Piping.

The figures illustrate devices which have been used in gas production and are also applicable to blast furnace work in connection with metallurgical plants. They are taken from *Progressive Age*, of July 1, 1905. Figs. 1 and 2 show a check

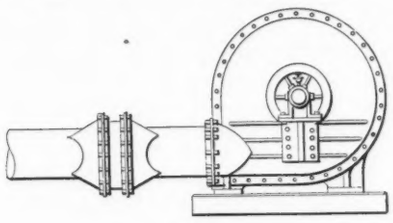


FIG. 1.

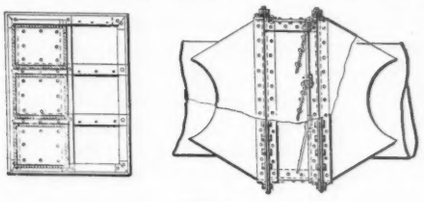


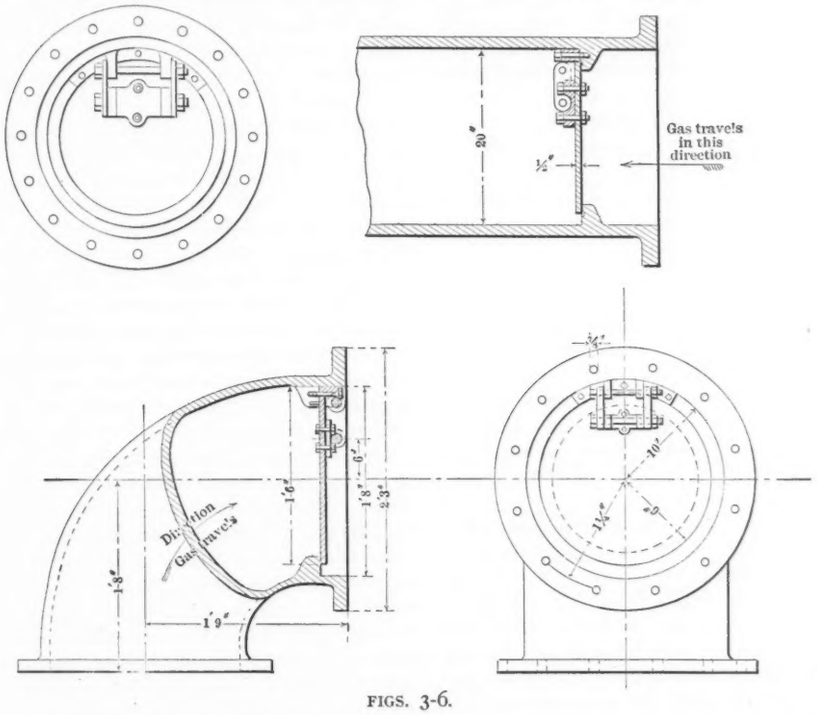
FIG. 2.

valve designed for use on high-pressure blowers, intended primarily to prevent damage to the blowers from a possible explosion in the blast pipe; they also serve to control the flow of air from the blowers and prevent its backing up through a blower which is not running. The arrangement is essentially a series of check valves taking the place of the old style blast gate.

A steel plate is set in the blast pipe at right angles to the flow and provided with a number of openings, this forming the valve seat. The checks are made up of ⅛-in. cloth insertion rubber packing, ¾ in. larger on three sides than the opening. The rubber is 2 in. longer on the fourth side, and this projection is bolted to the stationary plate, forming a hinge. Steel plates are bolted together on either side the rubber, giving the necessary weight and strength, while the projecting rubber around the side serves to make the joint tight when the valve closes up on the front side.

Fig. 3 shows a check-valve elbow, designed for practically the same purpose as the first. The valve plate hangs on a line hanger, bolted to the fitting. By means of a link around the valve plate it is made to take a parallel position, and makes a tight fit against the valve seat. This particular device is used at the blower outlet, pumping into the 5-lb. high pressure gas system at St. Louis. The data regarding it are furnished by J. E. von Maur, Supt. St. Dept., Laclede Gas Light Company, St. Louis, Mo. The device first illustrated is in use at the stations of the People's Gas Light & Coke Company, of Chicago, J. H. Eustace, engineer, having supplied the information upon which this description is based.

C. Lorenz, in *Tonind. Zeit.*, 1905, XXIX, p. 621, states that washing by sedimentation is the best means of eliminating impurities from clay, since any lime, marl,



FIGS. 3-6.

or pyrites present are only crushed and are more widely distributed in the mass when mills are used, the result being deterioration of the whole batch. Before deciding on the kind of purifier to use, the clay should be subjected to analysis, to determine whether mills or washers should be selected.

The Diamond Drill in Missouri.

BY R. D. O. JOHNSON.

Without the diamond drill, the great deposits of disseminated lead ore in southeastern Missouri would never have been discovered, and could not today be worked. The ore is galena disseminated through certain horizontal strata of magnesian limestone. The orebodies are of irregular outline, disposed at different depths and at different elevations, above the underlying sandstone that invariably marks the lower limit of the ore. They are overlaid with horizontal strata of generally solid, little disturbed magnesian limestone, of uniform texture and usually free from openings or chert. These characteristics render the diamond drill peculiarly fitted for the prospecting and development of this district.

In the early days, in starting to drill a particular tract, a position might be selected in accordance with some imagined trend of the ore, or it might be entirely at random. In the light of twenty years' experience, the trends of the orebodies are now fairly well determined; drilling is now directed with greater certainty of striking the ore, and with less waste of time and labor in blind casting about for a promising locality. There are no reliable surface indications of underlying ore.

All finished holes are drilled to the sandstone. Later practice is to drill to a considerable depth into the sandstone before quitting a hole; this is a precaution against stopping in a thin intercalated stratum of sandstone (that is occasionally found at some distance above the true bottom of the lead-bearing limestone). This practice developed from mining experience; in a number of instances, good bodies of ore (the presence of which was entirely unsuspected) were followed underneath a thin strata in which drill holes had stopped. Sandstone cuts the bits and rods, and wears the diamonds greatly, so that it is difficult to get a contractor to do much drilling in it. Contracts always stipulate a sand core.

The first hole striking lead ore serves as a basis from which is determined the location of other holes. Holes are generally placed 200 ft. apart horizontally, unless it becomes evident that this distance oversteps the orebody (in which case holes are drilled between). Careful direction of drilling generally succeeds in giving a fair idea of the lateral and vertical limits of the orebody in question. The character of the galena (with due attention to the associated minerals in the core) is a necessary guide in locating sites for subsequent drilling. A predominance of pyrite and chalcopyrite in the lower parts of the hole indicates nearness to the edge of a deposit; for it is our universal experience that bodies of ore are fringed with deposits of pyrite. A seamy core, with some calcite, or one containing

coarse-grained blocky galena (coming from the upper parts of the hole) may contain a high percentage of lead, but it indicates a small isolated deposit not worth going after. Such cores should not have any effect on the selection of sites for drilling. A hole a short distance away would probably show no ore at the corresponding level. It is for these reasons that the assay of a core may give information that in itself is entirely misleading. The appearance and the character of the galena grains, their size and structure, the associated minerals, and the depth at which the sample core was taken, constitute valuable data for determining the worth of the deposit and for the placing of neighboring holes.

The site of the drill hole being determined upon, a "sleeve-pipe" hole is dug to the solid limestone. In this is drilled, by hand, a hole 4 in. in diameter and 4 or 5 in. deep. In this socket is placed the "sleeve pipe" (usually 3 in. black pipe). The space between the rock and the pipe is caulked with oakum, the pipe is plumbed and the "sleeve pipe" holes are filled. The drill is moved over the hole and leveled, and all is ready for drilling. Water for supplying the boiler and bit was formerly hauled in barrels or tank wagons. This practice soon gave way to the more economical method of pumping water from some neighboring stream to the drills through long lines of pipe laid over the surface.

The drill best fitted for this region is one giving the bit high rotating speed, with light pressure on the bit. A drill embodying these necessary features, but otherwise poorly designed and cheaply constructed, has been able to displace and to keep out other drills designed for general use. The hydraulic feed has come to supersede all screw feeds. It follows the varying hardness of the rock accurately, avoids excessive pressure on the bit, and, as a consequence, reduces the cost on the item of diamonds.

The solid bit is used to the depth at which it is expected the ore will be encountered or until the drilling (or "sludge" washed up to the top of the hole) gives evidence of lead; after that the core bit is used. The appearance of the "sludge" naturally indicates the character of the rock through which the bit is passing, and a careful record is kept. Very rich lead usually does not core, but is ground up in the drilling. Its presence is then known only by its appearance in the "sludge." Shortage of the core does not necessarily indicate lead, though it is sometimes so reported, particularly if the ends of the cores show lead and are so worn as to indicate grinding.

It happens not infrequently that the water supplied to the bit fails to come to the surface, but escapes at some point where a porous stratum or a horizontal water channel following a bedding plane is encountered. Many schemes are employed to fill these openings and to bring the water to the top. Bran, saw-dust or manure (mixed with water to a thin consistency) is poured into the leaky holes. This is effective where the water is escaping through a porous stratum; but an "opening" is best filled with neat cement; this is poured in and allowed to set. None of these methods are effective, however, where water flows along these "openings." A hole encountering such an "opening" must be drilled "blind" or abandoned. An "opening" is the prime source of anxiety to the driller. One in which water is flowing and washing sand renders drilling below it very hazardous. The sand is apt to fill the space about the rods and bit as soon as the pump is stopped for any reason. An opening filled with standing water is dangerous, as at that point the diminished velocity of the upward flowing water about the rods allows the sludge to accumulate near the hole. A part of this accumulation will slip into the hole as soon as the pump is stopped, and there is great danger that the bit may be stuck. Aside from losing the hole and the work done on it up to that time, the bit contains from $1,200 to $2,000 worth of diamonds, which may be lost. Stock bits are usually recovered, but sometimes at an expense greater than the value of the diamonds.

"Channels" and "openings" are generally confined to the upper parts of the rock bed, and usually do not occur at a depth greater than 80 ft. When it is desired to drill a bed known to be particularly "channelly," the churn or drop drill is employed to cut through the dangerous ground to the solid rock; in the intervening space a sleeve pipe is set. These long sleeve pipes are made up in 10 and 12-ft. sections, and are pulled out after the holes are finished. Short sleeve pipes are left in place.

Churn drilling is contracted at $1 to $1.25 per ft. None of the mining companies owns a churn-drill outfit. They, however, own the diamond-drill outfits, and employ drillers and helpers on day's pay. Where four or more drills are run, they are generally operated under the charge of a foreman, whose duties include also setting the bits, keeping the records and caring for the cores. The setting of the bits is an important matter, particularly since the advance in the cost of diamonds. A good bit setter is rare and is well paid.

Under favorable conditions, with the solid bit, as much as 160 ft. have been drilled through solid magnesian limestone in 10 hours. The amount drilled per day, and, consequently, the cost per foot, vary greatly. In the extreme western part of the district, the upper part of the limestone contains much chert. This renders drilling particularly slow and difficult. Costs in this part of the region have gone up as high as $2 per ft., whereas in the region about Bonne Terre, drilling has been done as low as 25c. per ft. As the depth increases, naturally the cost increases. At some points near Bonne Terre, the ore lies within 50 ft. of the surface. In the Flat River region, it scarcely ever occurs at depths less than 125 ft., and sometimes as deep as 550 ft. Fifty thousand feet were drilled in the central part of the Flat River region, at an average cost of 48c. per ft. Contract prices range from $1 to $1.25 per ft., depending upon the part of the field in which the contract is taken. The great increase in the cost of diamonds, and the higher wages now paid, have of late rendered drilling a much more expensive proposition.

The care and marking of the cores and the keeping of the records are, of course, matters of first importance. In the early days of the district, neither cores nor records were kept; and drilling served only for the immediate guiding of the underground workings. Since that time, most elaborate methods of recording all information yielded by the drilling have been evolved. "Core houses," specially designed and adapted for the care and preservation of the samples, serve their purpose admirably. These "libraries in stone" yield original information that is not affected or distorted by the judgment or temperament of those who keep the records. On each fragment of core is marked the depth in feet from the surface at which it was drilled. The cores are arranged in trays, which are marked with the number of the hole and the part of the hole from which the core came. The trays slide into racks. Each driller is required to hand in a report of his shift's work, giving all information not to be found in the cores. From these reports and from the cores the condensed reports are made up. These condensed reports are sometimes further elaborated by a sketch of the hole showing a cross section of the rock and indicating by appropriate symbols the occurrences of galena, pyrite or anything else deemed of value. Surveying, leveling and mapping complete the record, and give the superintendent the information necessary to direct mining operations.

Underground diamond-drilling outfits are invariably a part of the mining equipment. These machines serve the purpose of filling in the details of the information, which is sketched in a general way by the original prospecting. They constitute the "feelers," as it were, of the mining equipment. They search through bars of barren rock for the ore beyond; they find water bodies and mud channels. They are invaluable for the immediate directing of workings, for keeping in touch with the ore and for avoiding dangerous ground. Their records are rarely saved, as the ground they explore is soon mined, or the mine soon extends around or beyond it. The underground drill works at a manifest disadvantage as compared with the drill on the surface. It must at-

tack the orebodies on the edge. A long hole may pass immediately above or below a good body of ore, and yet give no sign of its presence. In a high stope, considerable inclination can be given the holes, and the handicaps of the underground drill disappear correspondingly. Underground drill holes are rarely over 200 ft. in depth, generally not over 100 ft. Usually a number of holes, at different angles, are drilled from one setting of the machine.

Cupellation and Parting.

BY HERBERT R. EDMANDS.

Having read with considerable interest the abstract of Dr. Kirke Rose's paper on this subject published in this JOURNAL (April 13, 1905), and as the question is of considerable importance, I send the following notes.

Shape of Cupels.—Perhaps the importance of this is not recognized as fully as it should be; for instance, W. Lee Brown[1] states that the form of the cupel is immaterial; this however is not so. Most of the cupels and cupel-molds sold are of faulty design, the cup being usually too deep. In the sectional drawings of cupels, A and D are made from molds as purchased; B and E are from the same molds after plunger has been turned down; C is from a mold made to order; and F is a "morganite" No. 7 cupel. To determine whether the depth of cup influences the time required for cupellation, the following experiments were made:

Four cupels were placed in the muffle in the order shown—the letters designating the shape:

1 E	2 D
3 D	4 E

The cupels were made of equal weights of boneash and mabor [a refractory material composed essentially of magnesium borate]; they weighed about 60 gm. each, and after heating to redness, 30 gm. lead, containing a little silver, was placed in each. The time until the silver brightened was: 1 E, 29 min.; 2 D, 32 min.; 3 D, 31 min.; 4 E, 28 min. Thus the *shallow* form was 3 min., or 10%, quicker.

Another experiment was made with the smaller cupels, A and B, also made of equal weights of "mabor" and boneash, and placed in muffles thus: B—A—B.

After heating to redness, 15 gm. lead, containing silver, was placed in each; the time was: B, 20 min.; A, 25 min.; B, 20 minutes. In this case the *shallower* form was 5 min., or 20%, quicker.

Another trial was made using two "C" cupels of equal parts mabor and boneash, and one "morganite" No. 7 cupel "F," with 15 gm. lead in each; the time was, C, 20 min. each; F, 25 min. Here again the advantage is with the *shallower* form; but, as the material is different no conclusions can be drawn.

[1] "Manual of Assaying," English edition of 1893, p. 63.

It is evident, however, other things being equal, that the rate of oxidation of the lead is a question of surface; and that a greater surface is given in a shallow than in a deep cupel. For the same reason a large button of lead, as it presents a larger surface, will cupel at a greater rate than a small one, although taking longer. Thus with fourteen cupellations (the weight of lead taken varying from 70 to 15 gm.) the time occupied was from 47 to 20 min., but the rate was from 1.5 to 0.75 gm. of lead oxidized per minute, respectively.

Material for Cupels.—Dr. Kirke Rose has shown that London-made cupels of boneash are superior to Deleuil's or to magnesia cupels. It has been my experience that cupels made of "mabor" or

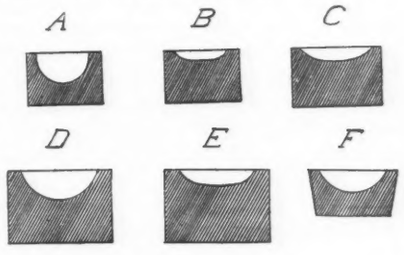


FIG. I.

mabor and boneash are superior to those made of boneash alone. As in my experiments the cupels were made on the spot by the same man, the results should be a fair guide to the relative suitability of the material.

In each case in the following experiment, four assays were made simultaneously, using the same weight of ore (2 a. t.) and fluxes. Two of the lead buttons were cupelled on boneash cupels, and two on cupels of equal parts of mabor and boneash (on same mold as shown in Table I, given herewith). The boneash was of the best quality, supplied by a well-known London house, and the cupels did not crack. The mabor was supplied by a local firm. The silver results are perhaps not very reliable, being mostly derived from the litharge used.

TABLE I.

	Cupels Used, Material.	Mould.	Lead Button, Average Weight Each.	Gold. oz.	Gold. dwt.	Gold. gr.	Silver. oz.	Silver. dwt.	Silver. gr.	Remarks.
1.	Mabor 50%, boneash 50%..	C	30.5 grams	2	12		3	13	12	Mabor and boneash
	Boneash.....	C	30.5 "	2	12		3	13	0	shows better Ag results.
2.	Mabor 50%, boneash 50%..	C	27.5 "	2	6		4	5	18	Mabor and boneash
	Boneash.....	C	27.5 "	2	0		3	17	12	better in Au and Ag.
3.	Mabor 50%, boneash 50%..	C	23.75 "	2	0		4	9	12	Mabor and boneash
	Boneash	C	23.75 "	2	0		4	1	0	gives better Ag results.

A test was now made on silver only—special care being taken to prepare pure silver. The results are shown (in Table II.) given herewith:

The cupels were placed in muffles thus:

1	3
4	2

The average loss was: Mabor and boneash, 1.19%; boneash only, 1.64%. Cupellation was performed at a moderate heat, but the cupels were not feathered; all cupels were apparently good and did not check. The results showed that neither could be said to be bad cupels.

Beringer[2], as the mean of three experiments in which 0.4 gr. Ag. was cupelled with 10 gm. lead, gives the loss at 6.5 mg. or 1.62%. Furman[3] gives Mason & Bowman's experiments, which show an average silver loss of 1.99%; also Kauffman's results should be studied.[4]

The influence of temperature is very great, greater than that of the material of which cupels are made. The results (shown in Table III.) were obtained when cupelling with the heat of muffle too high for good work.

TABLE II.

No.	Cupels.	Mould.	Pure Ag.	Lead.	Loss in mg.	Per cent. Loss.
1	50% mabor and 50% boneash.....	B	0.5091 grams.	10 grams.	6.7	1.33
2	50% " 50% "	B	0.5029 "	10 "	5.2	1.05
3	Boneash.....	B	0.5069 "	10 "	9.0	1.77
4	"	B	0.5030 "	10 "	8.6	1.51

TABLE III.

No.	Cupels Used, Material.	Mould.	Pure Ag.	Lead.	Loss in mg.	Per cent. Loss.
1	Mabor 50%, boneash 50%.....	B	0.4882 grams.	10 grams.	13.4	2.67
2	Mabor.....	B	0.4894 "	10 "	13.0	2.60
3	Boneash...	B	0.4868 "	10 "	11.2	2.25
4	Boneash.....	B	0.4844 "	10 "	13.3	2.67
5	Mabor, boneash and fireclay.....	B	0.4822 "	10 "	12.2	2.46
6	Morganite.....	F	0.4869 "	10 "	10.7	2.15
7	Mabor.....	B	0.4903 "	10 "	5.7	1.15
8	Mabor 50%, Boneash 50%.....	B	0.4871 "	10 "	7.5	1.55
	Average Loss.....					2.18

The position of cupels in muffle was:

1	2	3
4	5	6
7		8

[2] "Text Book of Assaying," 4th edition, p. 102.

[3] "Manual of Practical Assaying," 5th edition, p. 388.

[4] This JOURNAL, June 14, 1902, p. 829.

The results were: Boneash, average loss 2.46%; morganite, average loss 2.15%; mabor and boneash, average loss 2.09%; mabor, average loss 1.87%.

Other tests were made, but these are sufficient to show that "mabor" gave better results, either alone or when mixed with boneash, than boneash alone. The objection to the mabor cupels was that they were excessively tender when homemade; the addition of boneash remedied this.

Parting.—In assaying tailing or residue, it is usual to have a large excess of silver; otherwise with nitric acid, the gold may break up. Dr. Kirke Rose has pointed out a remedy for this in most cases; but if sulphuric acid be used, breaking up hardly ever occurs. The resulting gold, if parted in only one acid is about 991 fine, so the results are 1% too high; but in a bead weighing 0.0010 gr. this would amount only to 0.00001 gr. or 1-100 mg. The surcharge can be allowed for; but when so small a bead as, say, 3-10 mg. breaks up in nitric acid the result is always unreliable. I have used sulphuric acid for some years on low-grade assays and prefer it to nitric for that purpose; I first heard of its use in assaying, in Nevada City, California, and possibly it is still used on the Pacific Coast, but it does not seem to have found its way into any text-book. I use small test tubes about one-third full, and heat over a Bunsen, resting the test tubes on wire gauze, and parting several (four to six) at once over each Bunsen. With gold beads under 10 mg., at least 45 times their weight of silver may be present without their breaking up.

Lime-Sand Brick.

Experiments on making brick by hardening lime-sand were made by E. Cramer (*Tonind. Zeit.*, 1905, Vol. XXIX, p. 558). He used a fine and fairly pure sand, containing 83.5% of grains between 0.1 and 0.6 mm. diameter, and weighing 1.781 kg. per liter when shaken down. Two mixtures were made: one containing 4%, the other 6% of dry-slaked Harz lime, one portion of each being mixed by 15 rev. of the Steinbrück edge-runner mill, the other by 30 rev. All the mixtures contained 3% of water. A portion of each was pressed into cubes of 30 sq. cm. face, at once, the rest being stored 24 hours before pressing. The pressures were 150 and 250 kg. per sq. cm. respectively, and the blocks were hardened by steaming for nine hours, some at 6 atm., the rest at 9 atm. pressure. The results (referring to the number of revolutions employed in mixing) indicate that 15 rev. produce a sufficiently homogeneous mixture. Storing for 24 hours had no influence on the tensile strength, while the higher pressure used in molding the cubes had an adverse effect in nearly every case. On the other hand, the strength was greater in the cubes hardened under a steam pressure of 9 atm. than in those treated at 6 atm., a typical increase being from 59.8 kg. per sq. cm. to 147.6 kg. with 4% of lime; and from 119.8 to 177.0 kg. with 6% of lime. A comparison shows that the higher proportion of lime gives a stronger brick, but that the increase is not comparable with that obtainable by the use of a higher steam pressure in hardening.

Improvements in Gold Dredges.

BY GEORGE E. WALSH.

The development of the gold dredge is one of the most important features of modern mining, and its effect upon the world's output of the precious metal is important. The efficiency of the dredge of large electrical power has been demonstrated so successfully that the demand for the machines is now very large. There is hardly a concern making these gold dredges which is not working overtime trying to catch up with orders, a considerable proportion of which are for export.

The gold dredge has developed rapidly in the past ten years; the type once established, inventors and manufacturers have tried to increase the size and capacity. Improvements in these directions are characteristic of the newest machines. A number of big dredges are now in course of completion for the Klondike, where they will be operated in connection with a power plant established at Dawson City. These will average a total of 500 h.p. for each machine, divided into separate units of from 7 to 100-h.p. induction motors. These dredges will be among the largest in use, and they will be equipped with the most recent improvements. The powerhouse at Dawson City will contain a 400-kw. turbo-generator, driven by a 600-h.p. steam turbine. This will represent one of the first instances of a steam turbine used for mining purposes in the Klondike.

Similar gold dredges are being built in this country for operation in Australia, South Africa, South America and different parts of our Pacific coast. Five large dredges are now in the course of construction for a California mining company. These will have 75 buckets in line, with a capacity of 7 cu. ft. each; the total weight of the machines, exclusive of framework and hull, will aggregate 2,000 tons. Heretofore the largest dredges constructed have had only 65 buckets, with a capacity of 6 cu. ft. each.

The tendency to build larger and more powerful boats is noteworthy.

The earliest forms of gold dredgers in use were operated by steam, but it was found that they could be used profitably only where the ore was rich. The work of developing the dredger was retarded for a time, and it was not until cheap electric power was supplied that the present movement assumed great headway. California has been among the first in the field, both in developing long-distance electrical transmission and also in the utilization of current for extensive mining purposes. Starting with boats that would dig 20,000 cu. yd. of earth per month, they have gradually increased in size and capacity until the largest in operation today dig from 50,000 to 75,000 cu, yd. of material per month. But even this is not considered the limit. Several now in the course of construction will be capable of handling upward of 100,000 cu. yd. of earth a month. The 5-ft. bucket has been considered the standard for these machines in the past few years, but, as remarked, a few have been in operation with 6-ft. buckets, and now a number will shortly be launched in California with 7-ft. buckets.

With increase in the size of buckets, and with more of these on the endless chain, a corresponding increase in the size of the motors and hulls of the ship follows. The standard hull of the larger class of boats is 36 by 90 ft., but the newer craft will reach 50 to 120, and some are talking of launching craft 60 by 150 ft. On the latter boats 150-h.p. motors will be required for digging, and 75-h.p. motors for driving the centrifugal pumps. Corresponding increase in the size of the motors for operating the deck winches, stackers, deck pumps and screens will follow.

The size of the boat and its general outlines must be proportioned carefully to the number and size of the motors, for the strain of handling the gravel and screening is tremendous. The harmonizing of all parts of the boat has been a problem worked out by engineers and inventors so that all parts now balance well. Of the more than half a hundred boats now in operation in California most of them are of the bucket type.

A recent report of a machine expert showed that the gold boats were being manufactured in a score of different shops throughout the country, and that the output was about one machine a week. This limit was due entirely to lack of facilities for increasing the manufacture. Provision is being made to increase the output. Orders have been placed for enough machines to keep the present shops busy for the next five years.

According to W. Guertler and G. Tammann (*Zeit. anorg. Chem.*, 1905, XLV, 205—224), the nickel-steel melting point curve consists of two branches, with a discontinuity at 35% of nickel (1510° C.); the curve for alloys higher in nickel descends from this to a minimum at 66% (1465°) and gradually rises thence to the melting-point of pure nickel (1485°); while the curve for alloys lower in nickel remains at about 1500° down to 20%, and then gradually rises to the melting-point of iron (1550°). The 66% alloy corresponds to Ni_2Fe.

Notes on the Electro-Deposition of Copper.*

BY SHERARD COWPER-COLES.

The various processes for increasing the current densities in copper deposition by using mechanical means for keeping the copper smooth are classified as follows:

1. Revolving, or moving, the cathode, as in the processes of Wilde, Cotsworth, Wylie and Grant. The current density employed is comparatively low.

2. Burnishing the copper during electro-deposition, as in the Elmore process. The usual current density is under 20 amperes per square foot.

3. Insulating the growths on the copper so as to prevent further increase. For example, the Dumoulin process in which sheepskin and other impregnators are employed. The current density is 35 to 40 amperes per square foot.

4. Rapid circulation of the electrolyte. Examples: Thofehrn's process, in which impinging jets are caused to play on the surface of a rotating cylinder (current density, 50 to 100); Graham's process, in which the electrolyte is discharged on to a flat cathode surface (current density 300, just under the influence of the jets); Poore's process, in which the solution is sprayed on to the cathode, the stream forming the only electrolytic connection; Dessolle's process, used in Paris for coppering ornamental iron-work, and finally, Harrison's, likewise an impingement process. Impingement processes are not likely to be applied commercially until the amount of solution circulated can be greatly reduced.

5. Revolving mandrel at a critical speed (centrifugal process). This process has been developed by Cowper-Cowles. The mandrels are suspended vertically, and are provided with Pelton wheels, which are driven by the electrolyte impinging against them. In the most recent form, however, a tubular vat is used, and hollow mandrels suspended on ball bearings, through the middle of which run the spindles. These are driven by a worm gearing from below. An 8-ft. mandrel has to be driven only at about 50 revolutions per minute.

The copper is refined and manufactured into sheets or tubes in one operation, and is of a hard nature, similar to that which is cold-rolled; the process is at least 10 times faster than any existing electrolytic process; a high current can be employed without deteriorating the quality of the copper; there is no risk of lamination; the plant is simple and free from mechanical complications; the amount of copper locked up for a given output is small compared with other processes; finally, anodes of very impure copper can be used as compared to the anode copper used in other systems.

By using a mandrel in which a V groove has been indented, the spiral deposit that results can easily be pulled away, and then drawn down at once into wire, which can thus be made from crude copper in what is practically one operation.

[In the discussion of this paper, A. Stanley Elmore said the author had not mentioned heating the electrolyte as a method of accelerating the rate of deposition. He knew of one plant working the Wilde process in which the cathode was rotated rapidly, and the current density was by no means "comparatively low." The current density is occasionally pushed up to 30 amperes per square foot in the Elmore process, and has been carried up to over 200 amperes. A tensile strength as high as 42 tons per sq. in. has been attained. By the use of a burnisher the same high current density can be used with a less expenditure of power than in other processes. By a combination of burnishing and moderate circulation of electrolyte, better and more certain results can be obtained than by the "centrifugal" method.

Mr. Milbourne said that all that was claimed for the "centrifugal" process had been borne out by the results of the trials he had made with a practical plant on the Continent; and W. C. Prebble pointed out that in the "centrifugal" process the circulation of electrolyte took place just at the place where it was most needed, namely, the surface of the cathode.]

*Abstract of a paper read before the Faraday Society, July 3, 1905.

The Use of Balanced Electrodes.*

BY W. W. HALDANE GEE.

In ascertaining the weight of metal electrolytically deposited, by directly weighing the cathode in the electrolyte instead of removing the cathode and weighing it —after washing and drying—the real weight (M) is obtained from the apparent weight (m) by the formula:

$$M = \frac{m\,\Delta}{\Delta - \delta}$$

in which Δ is the density of the deposited metal, and δ that of the electrolyte. Inasmuch as Δ occurs both in the numerator and denominator of the expression, for most purposes it is not necessary to know the value of Δ with great accuracy. In the case of copper the value of Δ that may be used is 8.9.

An ordinary physical balance is employed, and a cylindrical cathode, suspended by a thin wire passing through a hole in the bottom of the balance case, is counterpoised in the electrolyte. The anode also is circular, and surrounds the cathode. Electrical connection is made to the cathode by a side wire while receiving a deposit, but is removed when the apparent increase of weight has to be ascertained. The method has been found very convenient in testing commercial types of ammeters. An accuracy of about 1% can be generally obtained, and with a little care and by increasing the amount of deposit, the accuracy can be brought under 0.5%. In some experiments both sides of the balance may be used simultaneously when the electrochemical equivalents of metals in different combinations may be compared and current efficiencies ascertained.

A number of experiments have been made with a mercury cathode and anode, the electrolyte being a solution of mercurous nitrate, or mercuric chloride mixed with potassium cyanide. The mercury cathode is enclosed within a shallow dish suspended in the electrolyte by a platinum wire. The anode is a layer of mercury at the bottom of the containing vessel. In the case of mercurous nitrate, it is shown that the current efficiency as a monad is affected by the presence of mercuric and basic compounds. For good results the mercurous nitrate solution must be carefully prepared and a strong solution used.

Modifications of the method may be used for the purpose of finding the density of electro-deposited metals, and for studying the relative loss and gain at anode and cathode.

Instead of an ordinary balance, a spring balance may be substituted. A Nicholson's hydrometer may be used both as a cathode and as a means of finding the amount of deposit.

The method will be useful in the laboratory and test room as a means of rapidly arriving at results with sufficient accuracy for many commercial purposes.

*Abstract of a paper read before the Faraday Society, July 3, 1905.

Labor Regulations in German Smelteries.

The *Reichsanzeiger* (official paper of the German empire) has just published an order of the Bundesrat, relating to lead smelters, lead color works and zinc smelters. The employment of females and youthful laborers in dust chambers and dust canals and in the transportation of the dust is prohibited; and such persons are not permitted to enter the premises mentioned. The workmen employed at the smelting furnaces, with the exception of those on the feed floor, are restricted to 8 hours work per day. The same rule applies to the laborers employed in the interior of cold stacks and in the cleaning of dust chambers and dust canals containing wet dust. Laborers engaged in cleaning dust chambers and dust canals containing dry dust are not permitted to work longer than 4 hours per day in the interior of such chambers and canals, and not more than 8 hours per day in all.

These rules go into effect January 1, 1906, unless the public interest will be better subserved by waiting. In that case the Bundesrat may extend the time to January 1, 1913, and may also modify the rules.

According to Charles Elley Hall, the production of building brick in New York in 1904 was 1,200,000,000.

Misplacement of Mining Shafts and Adits.*

BY STANLEY HUNTER.

The above title occurred to me when reviewing certain grave errors in mining development during the last few years in Victoria; and while criticizing methods which in some instances are still adopted, it must be understood that such criticism is not offered in any carping spirit, but with the object of pointing out certain possibilites of mistake which must always exist so long as those interested in, and having authority over, mines decide, without regard to expert opinion, upon the methods and details of the initial work.

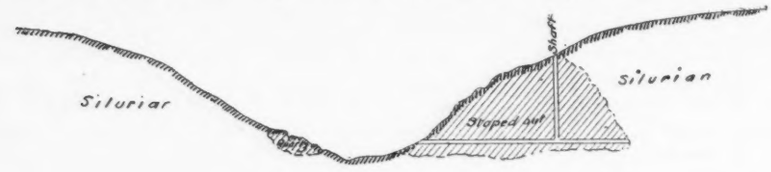


Fig: 1.

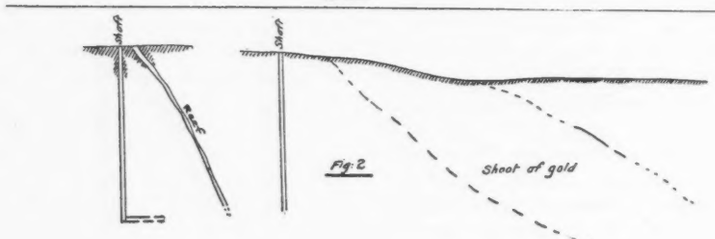


Fig: 2

So much money has been needlessly expended in certain districts in Victoria through the misplacement of shafts and adits, that astonishment may be expressed, not that mining has prospered in spite of such waste, but that it has existed at all. These mistakes are not confined to one class, but have occurred in quartz, coal and alluvial mines. The following are typical examples, but for obvious reasons the names of the mines referred to are withheld:

Quartz mines.—In one of the eastern fields a well-defined auriferous quartz vein was discovered outcropping down the face of a spur (Fig. 1). The Silurian rocks covered the upper portion of the quartz. By putting an adit into the hill at a sufficient height above the creek to allow for a dump, about 250 ft. of backs could have been stoped. Instead of such an ordinary method of mining being adopted, it was determined to sink a shaft nearly at the top of the spur. On completion of the shaft, a drift was extended along the vein toward the creek until an outlet was made, stoping at the same time being carried on. All the dirt and water were hauled up and the timber sent down the shaft. No reason was given for such method, which added so considerably to the cost of working, and although the ore averaged 16 dwt. per ton, the mine was unable to pay its way, and operations finally ceased, about £5,000 worth of gold having been won at a cost of about £6,000.

The next example occurred in one of the northwestern fields. The shaft was sunk at such a point that the auriferous shoot and vein both dipped away from it, necessitating a needless and heavy expense in cross-cutting and drifting, which, with a little forethought, could have been avoided (Fig. 2). No preliminary prospecting was attempted; the old workings, although dry, were not examined, and no geological sections were made, the directors depending upon a statement made by a workman who had some years previously been employed in the mine. Such faith certainly deserves a suitable reward, but the shoot of gold, when finally discovered, proved unpayable, and the mine is now shut down.

Coal mines.—At one of the first coal mines started in South Gippsland, poppet heads and a complete winding plant were erected, and a main shaft sunk to develop a seam of coal less than 100 ft. from the surface, which was, under later management, entirely worked out from tunnels (Fig. 3). The machinery erected was unused and represented a waste of about £7,000. The boring completed at the time this work was proceeding, was insufficient to determine the quantity of coal available, but was ample to indicate very closely the locality and position where the coal seam should outcrop. No use, however, was made of such data until all the initial work of shaft-sinking, etc., had been completed. Under new management the proper system of working the seam from a main tunnel was commenced and success followed.

Almost entirely the reverse happened in the next instance, where an attempt was made to develop a coal mine by adits, when shaft workings were unquestionably the best method to adopt. The section (Fig. 4) will explain the position and dip of the coal seam. An opening was made in a gully close to the creek, and at the first heavy rainfall the workings were flooded. A deep tail race was then cut for drainage, but the company still persisted in adopting tunnels to the dip as the best method of development. Needless to say, a very short distance was reached when the mine waters prevented any further progress. No pumping machinery had been obtained, or even considered necessary; consequently, mining ceased, and the tunnels were allowed to fall in. No systematic borings were attempted, although an expenditure of not more than £250 would have proved beyond all question the levels and quantity of coal available for profitable mining. Up to date several thousand pounds have been spent, and but little knowledge gained, although the mine could, under good management, be developed into a payable venture.

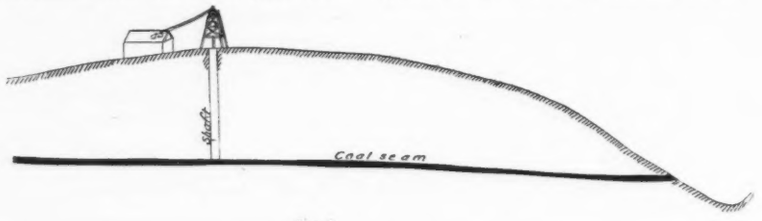


Fig 3

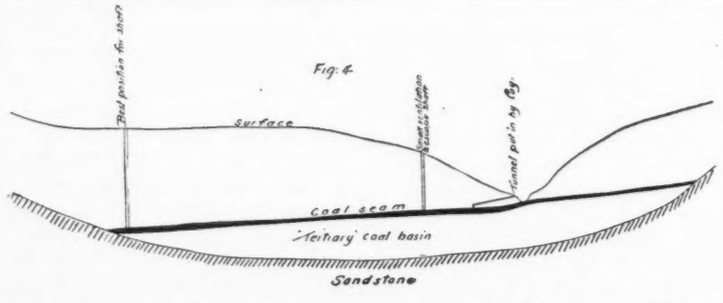


Fig: 4.

Alluvial gold mines.—It is in alluvial mining that the greatest number of mistakes occur, and yet, owing to the facilities for properly testing the ground prior to shaft sinking, and the comparative sim-

*Abstract of a paper in *Trans.* Aust. Inst. Min. Eng., Vol. X.

plicity of the work itself when compared with other classes of mining, there should be fewer. The blunders in many instances seem inexplicable, requiring for their avoidance, not highly-trained expert knowledge, but merely common-sense. What can be thought of management

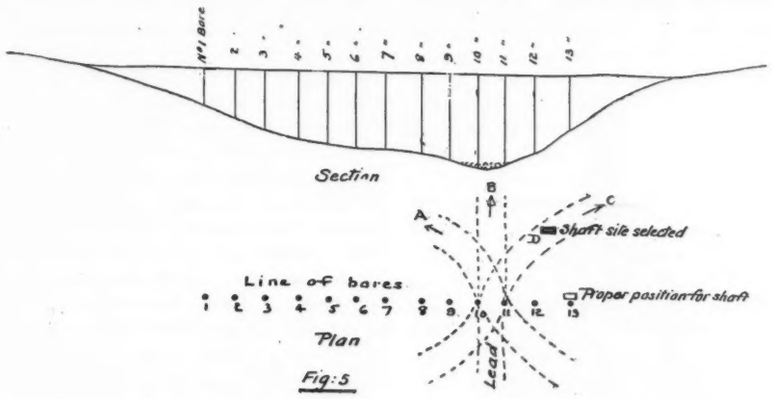


Fig: 5

which, in attempting to sink a shaft through a drift known to be dangerous, after losing the first shaft, commenced a second one, only a few feet away, in identically the same stratum and with the same appliances as used in the first? This, too, was lost, and the total waste of money has been variously estimated at from £20,000 to £25,000.

In another instance a complete line of bores was put down, a sectional drawing made and then the shaft site was selected at such a distance away as to render useless the data obtained by such boring (Fig. 5). The shaft should have been sunk at bore No. 13, the stratum there being known, while the immediate course or trend of the lead was unknown, and, as shown by dotted lines at *A*, *B* and *C* on plan, three possibilities existed for the direction by which the lead could cut through the lines of bores. Point *D* was the site selected. Two attempts to bottom the shaft have been made, both unsuccessful, owing to very much more drift being met with than was proved in the line of bores, and to a heavy inflow of water. The mine is now idle, and likely to remain so, representing a waste of about £10,000.

The following is an extract from a paper by me on diamond-drill and calyx boring; it refers to a mine on one of the southern leads of the State: "This section (Fig. 6) shows what actually occurred at a well-known mine in Victoria, and is typical of many similar mistakes. Point *A* was assumed to be the deepest part of the lead. Point *B* was actually the bed of the lead. Apparently without the slightest consideration, the shaft was sunk and the main level driven toward a point supposed to be below the bed of the lead. As might have been expected, a solid face of basalt was met with some distance from the shaft. A further depth then had to be sunk, a chamber cut and main level driven."

Near one of the large alluvial mining centers, two lines of Government bores, about 30 chains apart, had proved a fairly well-defined gutter, to develop which mining on a somewhat lavish scale was commenced. Unfortunately, no consideration was given to the marked difference (if, indeed, such fact was recognized by the company) in the bedrock levels between the two lines of bores, amounting to no less than 170 ft., or at the rate of about 450 ft. per mile; and notwithstanding the fact that the fall per mile in the bedrock of the main leads of Victoria is usually from 10 to 30 ft., it was assumed that a main lead had been discovered. Expensive machinery was erected, a shaft sunk 350 ft., and main drifts extended in various directions, each one of which, it is reported, reached the basalt, with the reef country dipping underfoot. Reconstruction of the company was effected, the shaft deepened to about 500 feet, and the same blind work of extending

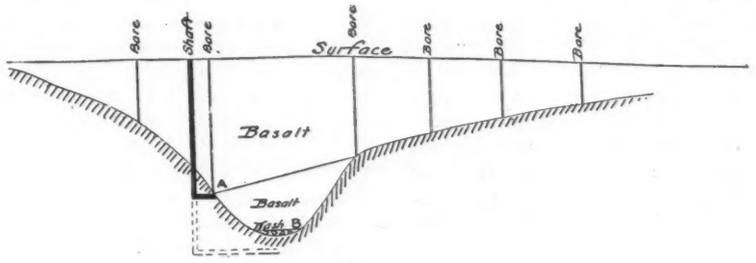


Fig: 6

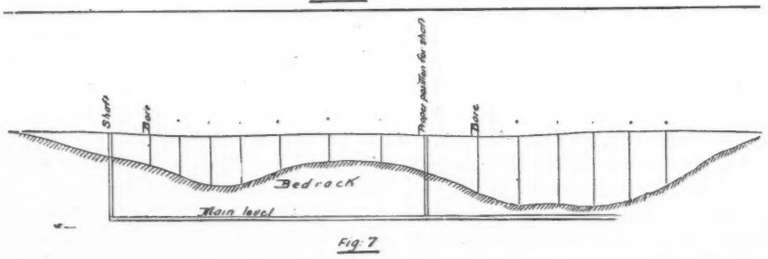


Fig: 7

bottom levels to prospect for the lead carried out. After many thousands of feet had been driven, and upward of £70,000 expended, expert advice was obtained, and the, to the company, astounding fact shown that the alluvial workings in progress, and which were unpayable, were on a tributary, and not, as supposed, on a main lead; the mine was promptly closed down.

The next example proves how unwise it is to sink a shaft before the boring, necessary to determine thoroughly the position of the lead, is completed. Fig. 7 represents the cross-section of an alluvial lead. On the completion of the first few bores the shaft site was selected, and sinking commenced. As the boring was carried onward it became evident that a much better position could have been chosen. It was, however, considered too late to make any alteration, and a distance of over 5,000 ft. is now proved to extend between the shaft and main gutter of lead. Similar instances have constantly occurred on the deep alluvial fields of the State.

The last example included in this paper is somewhat unique, and occurred on one of the western goldfields. The preliminary work of boring was carried out and the shaft sunk to such a level as to command the deepest portion of the lead. Fearing that one must drive through too much roof rock from the back of the main level, it was decided to drive that level at a much shallower depth than originally determined, and about 40 ft. of the shaft was filled up. Result, lost levels and a new shaft necessary. Even in the selection of No. 2 shaft, a lamentable want of common-sense was exhibited, low-lying ground near the creek being chosen, resulting in the slum quickly filling the bed of the creek and endangering the mine by flooding during heavy winter rains.

The foregoing descriptions of misplacement of shafts and adits, described as briefly as possible, are by no means overdrawn, and the wrecking of many large and reasonably hopeful mining schemes may be directly ascribed to such errors. When it is considered that the position and depth of a shaft, or the level at which an adit is driven, will make or

mar a mine, it is surely not asking too much that the most earnest attention and consideration shall be given to such all-important factors in mining.

Amber in Santo Domingo.

BY CLARENCE C. SAMPLE.

Public attention has recently turned toward Santo Domingo, the second largest island of the Greater Antilles. The island is divided politically into the republic of Haiti which occupies the western part (where the majority of the people are black); and the Dominican republic which occupies the larger and eastern portion of the island, the people of which are a mixture of Spanish blood with the original Indians, and to a less extent with the blacks. Santo Domingo is for the most part a rugged mountainous country, some of the peaks reaching an elevation of 8,000 ft. Two mountain ranges traverse the island in a general northeasterly and southwesterly direction, bordering on the northern and southern sea coasts. The northern range is known as the Monti Cristi range; that to the south, as the cordillera of Cibao. Between the two mountain masses lies the great royal plain, *La Vega Real* of Columbus.

The different inland towns are connected by the old Spanish roads which have remained to this day, but their condition is bad. Transportation by any other means than mule-back is out of the question. These roads could, however, at very little expense be converted into good highways.

The Monti Cristi range is made up entirely of sedimentary rocks, which consist of alternating strata of sandstone, shale and conglomerate. The area over which this formation extends reaches from Monti Cristi on the west to Samana bay on the east, and from the northern coast of the island south to the great central plain. The rocks are comparatively soft, and numerous rivers have cut their way through the strata. In the mountain region the strata have been much contorted, faulted and from their soft structure have been rapidly eroded, making the topography exceedingly rough and broken.

The extent of the amber-bearing section of these sediments has been only partially determined. Amber has been found in several places, but the region from which the greater part has been taken is known as the district of Tamboril. This section comprises about 50 sq. km., lying about 12 miles north of the city of Santiago. This area lies in a foot-hill region, drained by the Licey river, with its western fork, the Miguel Sanchez river, on the eastern side. Between the Licey river and its branches and the Gurabo river (which runs through the central portion of the district, parallel to the Licey), lies a mountain ridge, which divides the waters of the region.

The strata dip to the southeast at an average angle of 30°. In the eastern sections of the district there has been but little disturbance; but further west, near the Gurabo river, the strata have been thrown into many folds. In many places landslips have occurred, enormous banks having broken down, which the rains have afterward disintegrated into great banks of loose debris. When these banks contain amber it may be washed out by running through troughs with screens at the ends. The loose dirt is washed through the screens, while the amber is retained. Such a bank of debris lies at the upper waters of the Miguel Sanchez river.

On the eastern limits of the district, the strata in the outcrops are made up of alternating bands of blue and gray shales and sandstones. These layers are but a few inches thick, and are usually capped by a hard wide band of coral limestone. No conglomerate is seen, and no amber found in the shales and sandstone.

Passing to the westward, the strata in the Gurabo river are notably thicker and harder, while the conglomerates appear in bands, some of which reach a thickness of 10 ft. and here the amber is found. The limestone top has been eroded, as shown by enormous boulders lying in the river.

If there is any significant relation between the amber and conglomerate, it might possibly be explained from the generally accepted theory as to the origin of amber, namely, that it is the fossil gum of a species of pine.

Many of the shales and sandstone carry a little lignite, but not much of this has been found in any of the outcrops. As the productive amber strata of the German mines are beneath lignite, it was believed that a similar indicating layer of lignite might be reached in Santo Domingo, beneath which the amber would be found; but no work has ever been carried to a stratigraphical depth of over 200 feet.

In the upper waters of the Miguel Sanchez river, and in certain parts of the Gurabo river, natural gas has been found to rise from shallow drill holes in the rocks; and there are other signs of oil in the district.

The shales of the district are usually of a bluish or grayish color, although their outcrops present many variations in color, according to the extent of staining from iron oxide. From the blue color of the shales, when freshly broken, they have been called "blue clays," presumably from a supposed resemblance to the "blue ground" in which the amber from the German mines was taken; but the "blue ground" of the German mines is an earth, while that of the Dominican deposits is a hard rock, which is not immediately affected by running water.

In the German mines the "blue ground" is brought from the mines in baskets and dumped into enclosed troughs, through which runs water; the water washes the earth through the screens placed at the end of the trough, leaving the pieces of amber which are too large to pass through.

The Dominican shales carry a considerable amount of carbonaceous matter, especially when amber is found in them. The beds vary in thickness from a few inches up to 6 ft., and usually contain amber when they have much carbonaceous matter. No fossils are found. They contain much water, and after a few days' exposure, dry out, crack and become brittle.

The sandstones are made up of rounded grains of quartz, generally cemented together by calcareous matter. The individual grains vary in size from the varieties merging into shales on the one hand, and into the pebbly sandstones and conglomerates on the other. As a rule, the sandstones are light-colored, and some of them contain large quantities of broken shells. They also contain lignite in fine bands and threads, and when this is the case it is not unusual to find amber in them.

The conglomerates are made up of water-worn pebbles as large as 3 in. in diameter. They are embedded in an argillaceous mass, which seems to be slightly calcareous. The conglomerates are the hardest of all rocks in the series and resist erosion more. No amber has been found in them, nor carbonaceous matter.

The usual sequence of the shales is as follows: A band of conglomerate from 6 in. to 6 ft. is covered by a band of dark sandstone. Over this is a second band of a lighter-colored sandstone, carrying threads of lignite, which nearly always run parallel to the plane of the bedding. This sandstone layer carries amber, and is succeeded by a stratum of shale usually carrying amber. Above the shale follows a wide band of barren sandstone; then the conglomerate follows, and so the series repeats itself for 100 ft. or more.

It is not an easy task to decide whether a rock contains amber. The only criterion is the presence of lignite in the rock and this is not certain. The amber in a cubic yard amounts to only a fraction of a pound. Crushing the rock would also endanger the amber, so that for profitable working in the hard rock the amber must be found in considerable quantity.

The amber is actually found in pieces varying up to several pounds' weight. It occurs in the rock as a cast, and it is usual to find it surrunded by a thin layer of lignite. The amber is covered with a coating of dirt that can be removed only by scraping, and it frequently contains inclusions of dirt and decayed twigs.

The color of the amber varies from light yellow to deep red, and even black. The red amber can be bleached by a few hours' exposure to the sun. Surface cracks and a yellow brittle film form around the amber, which when scraped off leaves the inner portion light yellow.

The black amber cannot be bleached; it is worthless.

There is considerable variation in the quality of the amber. That found in hard rock is hard and lustrous, while that found in the loose débris of the weathered rocks is brittle and has lost much of its luster.

For use the amber is carefully cleaned. It is then placed in a cylindrical steel vessel, fitted with a plunger, through which are numerous small holes. The cylinder is placed in a bath of warm oil, when under the influence of heat and a heavy pressure the amber is forced up through the holes in the plunger in a pasty mass, which is at once pressed into blocks, in which form it reaches the market. The clouded appearance of some amber is not a natural effect, but is given by a slight increase of temperature in the refining process.

Amber was first discovered in this region from the pieces washed out by the rivers in flood season. Natives collected it and used it to start fires, and in a powdered form they smoked it in their pipes. It was an American who identified this substance. Having stopped over night in the hut of a peon, he was awakened in the morning by a bright light in the room. His curiosity was aroused by a peculiar aromatic odor; he found that a large lump, which the peon was burning, was amber.

A blood-red Chinese glass (according to the *Zeit. f. angew. Chem.*, 1905, p. 1054), which was examined by Chiri Otsuki, has the following composition: Silica, 59.58%; stannous oxide, 0.32%; cuprous oxide, 1.20%; lead oxide, 8.20%; ferric oxide, 1.39%; alumina, 8.38%; lime, 11.11%; magnesia, 1.70%; potassium oxide, 2.74%; sodium oxide, 5.27%; manganese, trace; total, 99.89 per cent.

It is reported (*Chem. Trade Jour.*, July 22, 1905) that in the neighborhood of Malelane and Kaapmuiden, 100 miles from Lourenco Marquez, in South Africa, large deposits of magnesite, equal to the best Grecian, have been found. A hill near what is known as Salt creek appears to be one vast deposit, about 2,000 ft. long by 200 ft. wide, and upward of 300 ft. high. The position is such that the deposit can be quarried at a very low cost.

One of the most satisfactory oil filters known is "home-made," requiring only two cans and a supply of cotton wicking. The cans are placed at different levels and the upper one filled with the oil to be filtered. The cotton wicking is saturated with *clean* oil and suspended over the the edge of the upper can, forming a capillary siphon. The end of the wicking should be allowed to touch, or lie on, the bottom of the upper can. The capacity is only limited by the size of cans and the number of wicks used.

Heavy Submarine Blasts.

The largest submarine blast in this country since the Hell Gate explosion in the eighties (when Flood Rock, a grave menace to navigation, was blown up and removed) took place on Saturday, July 22, at Henderson's Point, Portsmouth, N. H. The explosion took place in connection with improvements now in course

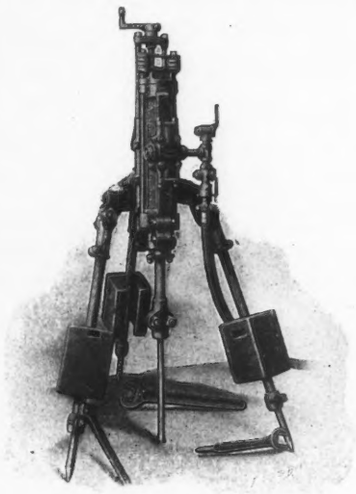


FIG. 1.

of construction at the United States Navy Yard at that place, and is reported to be the largest blast ever made by simultaneous explosion of a large number of holes.

Three hundred loaded holes were fired as one shot. They were arranged in 45 groups, each group being provided with 20 exploders; the entire number, 900 exploders, was set off by the closure of a single switch. The discharging current, at 110 volts, was 75 amperes. The 45 groups were aranged in multiple, and the twenty exploders of each group, in series; so that each individual exploder took 1⅔ amperes at 5½ volts.

Ingersoll-Sergeant, Sullivan and Wood drills were used in putting down the holes. A Wood drill is illustrated in Fig. 1.

The exploders were furnished by the Star Electric Fuse Works, of Wilkes-Barre, Penn., and were made especially to suit the unusual requirements of this work. The details of their construction are shown clearly in the accompanying illustrations—Figs. 2 and 3.

In this connection, we may mention the projected removal of the ridge of rock in New York bay, between the Narrows and the Hudson river, contracts for which, we understand, are now being let. This contemplates the blasting away of about 40,000 cu. yds. of rock. The upper surface gives a depth of 28 ft. at low water at present, but constitutes a menace to the navigation of the deep-draft ocean steamers using this channel. The depth is to be increased to 40 ft. at mean low water.

Copper in Honduras.

A promising discovery of copper is reported (*United States Consular Report*, No. 2261, May 18, 1905) to have been made recently in the department of Yoro, in Honduras, where eight well-defined veins of apparently good width and long extent have been located. The properties are said to be surrounded by forests of oak and pine; a coal deposit is within 20 miles; there is abundant water power sufficient for any machinery needed for reduction, and the discoveries are comparatively close to transportation, 40 miles from the Ulua river (which is connected by canal with the bay at Puerto Cortes, from which point there is daily communication with the United States).

According to an Austrian patent (No. 161,776, by S. Metzel) antimony oxide is prepared from the crude sulphide by warming the powdered ore with sulphuric acid in the presence of alkali (sodium or potassium) sulphates. A crystalline double sulphate of antimony and the alkali-metal separates on cooling; and on boiling this with water, it is decomposed; the antimony oxide is left, releasing the acid, which is used over again.

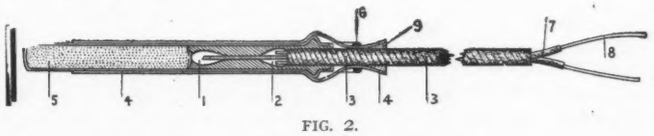


FIG. 2.

FIG. 3.

1. Patented match-head with platinum wire bridge.
2. Soldering spots, connecting the match-head to the fuse wires.
3. Duplex rubber wire No. 20, flat, with double cotton insulation heavily saturated.
4. Rubber hose, pushed over finished exploder, to make it absolutely water-tight.
5. Fulminate of mercury in copper shell, 46.3 grains.
6. Bare copper wire, used for tying the rubber hose tight to the fuse wire.
7. Showing the rubber insulation on the wires.
8. The bare copper wires, No. 20, tinned.
9. Waterproofing compound.

Compared with oil gas, the use of producer gas is not attended with the risks of fire and accident, with the varying price and uncertainty of delivery of oil, nor does it require a forced draught.

Protecting Steel by Paper Covering and Paint.*

BY LOUIS H. BARKER.

About 11 years ago experiment was begun with iron-paint preservatives to ascertain the best one to resist the action on steel or sulphurous gas, combined with moist steam. Since that time 50 or more paints and combinations have been tried. Among them were many kinds of asphaltum, rubber, graphite, carbon, lead and iron paints. Although they showed varying degrees of resistance, even with three coats, not one was found that did not show rust in less than a year. (The exposures were made so as to subject the test bars to the severest action possible in order to obtain the quickest results.)

In making the first series of tests, new steel plates 10 in. sq. were used. As, however, rusty steel is more difficult to preserve than new steel, rusty plates were substituted in all tests thereafter. Moreover, new plates were hung up and exposed to the fumes until they became covered with scale, the thought being that an oxide scale, due to atmospheric exposure, might give different results. The scale on these new plates apparently varied not only in amount, but also in the time of its formation, supposedly due to different chemical composition. As this might give some variations in the experimental results, in order that all paints should be on as like a footing as possible, angle bars 11 ft. long were hung in the smoke until rusted, then cleansed with wire brushes, each foot of the bar painted with a different paint and again hung up. The results, however, continued to be unsatisfactory.

Examinations of the test bars from time to time showed that upon many of them the paint was intact, but with protruding points, which, upon being pricked, were found to be small rust formations pushing up the paint from behind, clearly indicating that it was not the failure of the paints, but the rust action on the inner surface that caused the damage. As no rust can form without the presence of moisture, and as all paints are pervious to moisture, this led to the conclusion that it would be necessary in some way to seal the surface tightly. After trial of many kinds of material, it was decided that a cheap paraffine paper answered the purpose best. This was tried in a small practical way. After two years and three months' exposure, an examination showed the outer paint, the paper and the first or adhesive coat all intact, and in many places where paper was removed for examination, the adhesive coat not yet dry and the surface of the steel the same as when painted.

With such satisfactory results in smoke tests, it was concluded to make a test on a large number of I-beams, supporting a floor, over and within a few feet of salt water, and upon which the rust was due not to smoke, but to the almost continuous dampness and presence of sewer gas. This was done over a year ago, and up to this time no indication of damage is apparent.

The mode of application of the paper is as follows: After the rust is carefully cleaned off by means of stiff wire brushes, a certain kind of "tacky" paint is applied, and the paper is covered over and tightly pressed upon the painted surface, the joints of the paper slightly lapping. As soon as the paper is in place, it is ready for the outside coat of paint. It will be observed that by this process the first coat of paint, the paper and the coat of paint over the paper can be applied with one scaffolding, thereby greatly reducing the cost, especially in high and dangerous places.

These experiments, extending over only three years, are of too short a duration to determine the value of paper as a protection for iron and steel, but they certainly bring out the fact, at least in the case of smoke and gases, that the action begins from behind the paint, and not from in front by the disintegration of the paint.

*Abstract of a paper read before the American Society for Testing Materials, June 30, 1905.

Deep Coal Mining in Belgium.

John Gerrard, H. M. inspector of mines, in testimony before the Royal Commission on Coal Supplies, gave the following account (*Colliery Guardian*, June 16, 1905) of the Produits Colliery, Flénu, Mons, Belgium (No. 18 pit. Sainte Henriette).

Downcast and drawing shaft, 3,773 ft. deep, from which depth coal is drawn in one lift. The shaft is elliptical in form, 10 ft. by 8 ft. 2 in. Upcast shaft is round, from surface to 1,968 ft. it is 9 ft. 10 in. diameter, the remainder 9 ft. in diameter. The seam is called No. 6, and the section is: Coal, 1 ft. 3.74 in.; schist, 7 in.; coal, 1 ft. 1.77 in.. Total, 3 ft. 0.51 in. (total coal 2 ft. 5.51 in.). Inclination, 20 to 25°, 1 in 2.74 to 1 in 2.14. Thirty-three persons are employed in coal-getting, in day shift only; they work at the face 9 hours, and get 4 1-3 tons per man, or 130 tons per day total product. A total number of 107 persons is employed in the day shift, and 113 persons in the night shift.

The highest temperature (104° F.) was obtained in the return airway. This contained 38% humidity. In the last of the working places the temperature was 103° F., and the percentage of humidity was 43. Traveling against the air toward the intake, the temperature lowered gradually.

The rock temperature at 3,773 ft. depth was 113° F., and 63,000 cu. ft. of air per min. passed through the mine. Mechanical ventilator, Rateau fan, 9.18 ft. diameter, 55 r. p. m.; water gauge, 3½ in. All the currents were brisk, the air traveling through the working places at a velocity of 6 to 9 ft. per second. Water is taken into the mine for the men to drink in barrels holding 6½ gal. The men drink from ½ to ¾ gal.; in addition, most of the men take a bottle of tea or coffee.

The winding engines have a pair of high-pressure cylinders, 43 in. diameter, stroke 6 ft. 6 in., steam pressure 88 pounds.

The ropes are Manila aloe, flat, tapered; at the drum end 15½ in. wide by 1.96 in. thick, at cage end 8.8 in. wide by 1.14 in. thick. The total weight of 4,101 ft., inclusive of rope on drum, is 14 tons; the weight from the pulley about 12½ tons.

The cages are four-decked, one tub in each deck. Weight of cage 1½ tons of 2,240 lb.; of four empty tubs 15½ cwt.; weight of coal in the four tubs 1.41 tons. Time taken in actual winding is 2 min., or inclusive of changing tubs 2¾ min. The guides in the shaft are iron rails.

South American Notes.

BY FRANCIS C. NICHOLAS.

Gold in Terra del Fuego.—Reports from Chile and Argentina state that there is some excitement in regard to discoveries of gold on the beaches of the islands in Beagle canal, south of Terra del Fuego. On the large island of Terra del Fuego gold has been mined for a number of years, and some of the beach washings are said to be important; but the discovery that gold is on the smaller islands is a later matter and only recently has public attention been attracted to these. The islands are being occupied by both Chilean and Argentine miners; and, as the treaty establishing the boundary between these two countries is not clear in regard to the possession of these islands, trouble is indicated between the two countries. The coming summer is regarded with some apprehension, for the islands are valuable and both countries claim them. In Chile some of the newspapers have gone so far as to urge that the Government should protect the rights of her citizens by sending warships at once to take possession of the islands, and then to let Argentina attack if she wishes.

Potassium Salts in Chile.—It is reported that at Santa Catalina extensive deposits of potassium salts have been discovered which are destined to be of commercial importance. These have been secured by a syndicate in Santiago. Don Alfredo Wood and Don Pedro Ramirez, mining engineers from that city, are on the property to make a report and prepare plans for development.

Marble in Chile.—Don Juan Antonio Alverez Rojas has discovered, in the nitrate regions of Chile, near Tres Marias, extensive beds of white marble; this is said to be pure and of fine texture, suitable for the most exacting uses. Aside

from an active local demand which is sure to develop in Chile, it is believed the merit of the marble will carry it to foreign countries.

Gold dredging.—A prominent mine owner of Buenos Ayres, Sr. Roberts, recently started for Europe, where he proposes to purchase dredges to operate his extensive deposits.

New copper plants.—At Antofagasta, Chile, a company, "Sociadad Industrial de Cobre de Antofagasta," has been organized by local capitalists. The home office of the company is at Santiago. Extensive works will be established; it is stated that the money is fully subscribed. The company will operate a wet process and has ordered machinery capable of treating 200 tons per day. Mineral will be transported by an extended wire tramway from Mantos de Varas to the sea, a distance of about 2¾ miles. The president of the company is the former Minister of the Treasury, Don Ernesto Hubner. The new works hope to treat ores of 2.5% copper. In a country like Chile (where there is much low-grade ore) this should give an impetus to mining.

Nitrates.—Activity is reported throughout the nitrate regions in Chile. A new company, known as the "Aurara de Antofagasta," has been organized. A branch railroad is under construction to the recently discovered nitrate beds belonging to Jose Antonio Moreno. The registry lists are full of reported sales of nitrate beds to parties who will operate them.

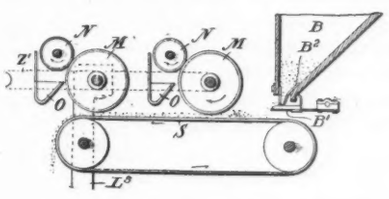
Mine disorders.—Reports from Chile state that trouble exists in the mining regions, and especially at some of the more remote places, where at times there is almost a reign of terror. In Chuquicamata the conditions are particularly bad, and arrangements are being made to establish a system of rural guards.

Diamonds in Colombia.—It is stated (on rather irregular authority) that, in the Goajira country of Colombia, diamonds have been discovered by the Indians of that region. Goajira is a peninsula, part of which forms the western boundary of the Gulf of Maracaibo. The topography presents a series of plains laid down in front of barren mountains. The climate is dry and the lands arid. The plains show sandy sediments overlying Miocene (?) clays and marls. The mountains consist of intrusive crystalline and trappean rocks. The formation is one in which diamonds might occur. Local rumor has it that the Goajira country is also rich in minerals. The territory is occupied by a vigorous tribe of Indians known as the Goajiras, who resent intrusion. For this reason the region has been but little explored. An American syndicate exploring that part of Colombia proposes to develop coal, to acquire mines and establish works of public improvement.

The Sutton-Steele Electrostatic Magnetic Separator.

The Sutton-Steele electrostatic magnetic separator is described in U. S. patent, No. 794,647. The comminuted ore is fed from the hopper *B* to an endless rubber belt *S*, having a thin metal coating, so that it is practically an extended Leyden jar. By contact with a comb the outside metal coating of the moving belt becomes statically charged. The belt carrying the ore passes under the magnetic rollers *M*, each provided with a cleaning roller *N*. These magnetic rollers are charged with static electricity by induction from the belt, and at the same time are energized from a dynamo. The static charge on the belt tends to repel the particles thereon, partially neutralizing gravity, so that very feebly magnetic particles are lifted and controlled by the magnetic rollers. The static charge on the belt also induces a mutually repellant action of the particles of ore, so that they are more free to obey the lines of magnetic force.

Many mineral substances have non-magnetic metallic bases that become susceptible to magnetic attraction when simultaneously charged electrostatically, and this enables a separation that can-



not be secured otherwise. When the electrostatic charge is properly regulated a partially conductive substance, separated by the repulsion, may rise across the zero line between the opposed electric fields without reaching the magnetic roller, but be kept oscillating across the zero line. This permits great freedom of movement of all the particles, and in passing under a series of magnetic rollers the most feeble magnetic particles have an opportunity to separate, so that a thorough and economical concentration is effected.

After touching, or nearly touching, the magnetic rollers the non-magnetic gangue returns to the belt for discharge, while the magnetic particles are removed by the cleaning rollers. Each magnetic roller has a series of magnetized faces insulated from each other, and each cleaning roller has an insulated body and metal face adapted to be inductively energized by the magnetic roller. Each cleaning roller rotates with the face moving oppositely to its magnetic roller, and the magnetic charge is collected on the cleaning roller at the point of nearest approach. Though the charge is of the same strength, the magnetic particles are unable to pass the point of contact, and transfer to the cleaning roller, being removed therefrom by a rotary conveyor to a hopper.

The Use of Boiler Compounds.*

BY WILLIAM M. BOOTH.†

There are three chemicals which are known, even by unscientific men, to attack boiler scale. These are caustic soda, soda ash and tannic acid compounds, the last being derived from sumac, catechu and the exhausted bark liquor from tanneries.

Caustic soda in large excess is injurious to boiler fittings, gaskets, valves, etc. That it is injurious, in reasonable excess, to the boiler tubes themselves, I have yet to prove. Foaming and priming may be caused through excess of caustic soda or soda ash, as is well known by every practical engineer. I can strenuously condemn tannic acid, and of the use of its salts, I am fearful. It may unite with the organic matter, present in the form of albuminoids, and with calcium and magnesium carbonates. That it removes scale is an assured fact; that it removes iron with the scale is also assured, as tannic acid corrodes an iron surface rapidly.

Compounds of vegetable origin are widely advertised, but they often contain dextrine and gum, both of which are dangerous, as they coat the tubes with a compact scale, not permitting the water to reach the iron. Molasses is acid and should not be used in the boiler. Starch substances generally should be avoided. I have not investigated the action of kerosene, but in large quantity its use must be dangerous, as it is very volatile and must soon leave the boiler and pass over and through the engine.

There are two materials, the use of which in boilers is not prohibited through action upon the metal itself or on account of price. These are soda ash and caustic soda. Sodium triphosphate and sodium fluoride have both been used with success, but their cost is several hundred per cent greater than soda ash. If prescribed as per analysis, in slight excess, there should be no injurious results through the use of caustic soda and soda ash. It would be practicable to manufacture an intimate mixture of caustic soda and carbonate of soda, containing enough of each to soften the average water of a given district.

There is a great deal of fraud in connection with boiler compounds generally. The better class of venders advertise to prepare a special compound for special water. This is expensive, save on a large scale, in reference to a particular water, for it would mean a score or more of tanks with men to make up the mixtures. The less honest of the boiler-compound guild consign each sample of water to the sewer and send the regular goods. Others have a stock analysis, which is sent to customers of a given locality, whether it contains iron, lime or magnesium sulphates or carbonates.

Any expense for softening water in ex-

*Abstract of an article in *The Chemical Engineer*, April, 1905.

†Chemical engineer, Syracuse, N. Y.

cess of 3c. per 1,000 gal. is for the privilege of using a ready-made softener. Every superintendent in charge of a plant should insist that the compound used be pronounced by competent authority free from injurious materials, and that it be adapted to the water in use.

Boiler compounds should contain only such ingredients as will neutralize the scale-forming salts present. They should be used only by prescription, so many gallons per 1,000 gal. of feed water. A properly proportioned mixture of soda ought to answer the demands of all plants depending upon that method of softening water in limestone and shale regions.

The honest boiler compounds are, however, useful for small isolated plants, because of the simplicity of their action. For plants of from 75 to 150 h.p. two 24-hour settling tanks will answer the purpose of a softening system. Each of these, capable of holding a day's supply, provided with a soda tank in common, and with sludge valves, has paddles for stirring the contents. Large plants are operated on this principle, serving boilers of many thousand horsepower. Such a system has an advantage over a continuous system, in that the exact amount of chemical solutions required for softening the particular water can be applied. For some variations of such a system, several companies have secured patents. The fundamental principles, however, have been used for many years and are not patentable.

Indiana Coal.

The report of James Epperson, State inspector of mines for Indiana, shows that in 1904 there was mined in that State a total of 9,872,404 short tons of coal; a decrease of 120,149 tons, or 1.3%, as compared with 1903. Of the coal mined last year, 9,145,332 tons were bituminous coal, and 727,072 tons of the grade known as block coal, which is mined in the Brazil and adjoining districts. At the close of the year there were 137 companies or firms operating 210 mines; an increase of 23 companies and 32 mines. There were 42 new mines opened during the year, and 10 old mines abandoned. The list does not include any pit or opening wherein less than 10 men are employed.

Of the coal mined, it is estimated that 5,304,906 tons, or 53.7%, were consumed in Indiana, while 4,567,498 tons, or 46.3%, were shipped to points outside the State.

Owing to the short average working time, as shown below, the earnings of miners, who are paid by the ton, were low last year. The average wages of miners for the year were $465.03; of inside day-men, $624.38; of outside day-men, $645.96. The total amount reported paid in wages for the year was $9,165,405, which makes the average earned for all employees, $513.81; and the average wage-cost 92.84c. per ton of coal.

Machines are used to a considerable extent in Indiana, though the comparatively small differential between pick and machine mining rates does not make their use as economical as it should be. The total number of machines reported in 1904 was 395, of which 291 were electric chain-cutting machines and 104 were compressed-air punchers. There were 30 electric motors, 67 dynamos and 28 air-compressors reported in use. The coal mined by pick and machine is reported as follows:

	Machine.		Pick.	
	Tons.	Per Ct.	Tons.	Per Ct.
Block coal	86,505	11.9	640,567	88.1
Bituminous	3,499,669	38.3	5,645,663	61.7
Total	3,586,174	36.3	6,286,230	63 7

The total number of days mines were worked was 29,441; this would give an approximate average of 140 days for all mines. There were 1,421 mules used in underground haulage.

The number of employees in the mines is reported as follows: Pick miners, 8,806; machine runners, 380; machine helpers, 380; loaders, 3,046; inside day-men, 3,449; outside day-men, 1,777; total, 17,838 men. The figures given above show that, for the year the average coal mined per machine employee was 942 tons; per pick miner, 714 tons. The average per man, including all employees, was 553 tons.

Accidents are reported fully. The non-fatal accidents are divided into serious and minor. The total number reported for the year and the averages per 1,000 employees are as follows:

	Number.	Per 1,000.
Fatal	34	1.91
Serious	132	7.40
Minor	81	4.54
Total non-fatal	213	11.94
Total casualties	247	13.85

The causes of these casualties are given in considerable detail; they are shown in the following table:

	Fatal.	Serious.	Minor.	Total.
Falls of slate	13	38	25	76
Falls of coal	..	15	20	35
Smoke explosion	1	2	..	3
Powder explosion	3	5	..	8
Dust explosion	..	3	..	3
Delayed shots	5	3	..	8
Premature shots	..	5	..	5
Blown-out shots	..	1	..	1
Misplaced shots	..	1	..	1
Mine cars	7	40	20	67
Mine cages	..	9	4	13
Mining machines	..	3	2	5
Electric shock	1	1	..	2
Shaft accidents	4	3	..	7
Miscellaneous	..	3	10	13
Total	34	132	81	247

Falls of slate and coal were the chief cause of accident, resulting in 38.2% of the deaths and 44.9% of the total casualties. The movement of mine and railroad cars came next, causing 20.6% of the deaths, and 27.1% of the casualties. Bad shots were the occasion of 14.7% of the deaths and 6.1% of the total casualties. Evidently, the introduction of shot-firers, or greater care resulting from the agitation of the question, has had a favorable effect, in reducing the casualties from windy or imperfect shots.

Excluding the minor accidents, the occupations of the men killed, or seriously hurt, were: Miners, 96; machine runners, 5; helpers and loaders, 2; drivers, 47; day-men, 12; shot-firer, 1; mine-boss, 1; outside laborers, 2. The ratio of casualties among miners was 10.90 per 1,000, or slightly higher than the general ratio, which was 9.31 per 1,000 employees.

The Yukon Territory.*

I confess that I came with the impression that this was a region in which man was fighting a hard battle with Nature, all of whose forces and passive resistance were arrayed against him at every point. That impression has been considerably changed. I have seen that Nature is not wholly hostile to you. Along with her bounty of gold, she has blessed you with an abundance of water—the agent which deposited that treasure, and upon which you must chiefly rely for its extraction.

This water furnishes you also with a trunk highway for transportation, and with sources of mechanical power, to which may be added, in your beds of coal, another essential of your industry. Man has done much already to promote the industry of your territory. Good roads, good laws, good government, with a good governor too, good, honest, earnest people—these things are more important, in the long run, than conditions of climate or distance.

But I must confess to another impression with which I came here, namely, that this region was one in which a few deposits of gold of extraordinary richness were to be swiftly exploited and exhausted—probably at great expense and relatively reduced profit—after which it would be necessarily abandoned again to the Indians and the wild beasts, as no longer able to repay the labors of man.

Is that true? It might be. There have been such regions, but I do not think this is one of them. The Yukon territory depends for its future upon the extent of the rich gold deposits now workable at a profit; the extent of the deposits available hereafter; and the resources which may be made to reinforce these and would be left if these were gone. The latter need not be considered now, for the former, in my judgment, ought to be sufficient for your children and your children's children.

But rich clean-ups from placer and hydraulic mines, like rich yields in stamp mills and furnaces, are not proofs of permanent prosperity. When only rich returns are made, it is not because everything in the district is rich, but because what is not rich cannot be worked without loss. There never was a mining district in the world that contained all rich and no poor ore, all coarse gold and no fine, any more than there ever was a cow that gave all cream and no milk. Where such concentrations of value as

*An address, delivered by Dr. R. W. Raymond, Secretary of the American Institute of Mining Engineers, at the farewell banquet given to the visiting party of the Institute at Dawson, Y. T., on Saturday, July 15.

those which we have seen in this neighborhood are shown, you may be sure that there are immeasurably larger quantities and values scattered through inferior material; and the mining industry becomes a really profitable business, giving steady and abundant employment to labor, dividends to capital, and a healthy atmosphere both of trade and of social life to the community, in those regions where it operates on low-grade material.

We are all interested, of course, in seeing a skillful expert show us a dollar's worth of nuggets and scales of gold to the pan; but those of us who have followed the business of mining for years are looking quietly away from that pretty exhibition, and trying to estimate the available ground which, yielding less, ought, under suitable conditions and proper handling, to *pay* more and *last* longer. It is not what this territory can do on a first spurt, but what it will do when it gets its second wind, that fixes its destiny for the present century.

Forty years ago a certain silver-mining district in Nevada was famous for the extraordinary richness of its ores—ruby silver, silver glance, and the like, worth (in those days) over $20,000 per ton; and when as United States Commissioner of Mining, I visited that district, they boasted to me that not one ton of ore had ever been milled in the district that did not yield at least $125. But this proved only that they were unable to treat with profit at least nine-tenths of the ore they had to mine in order to obtain the one profitable tenth, and the yield of that rich tenth was in reality wholly wasted upon the expense of mining the rest; so that at that very time when the average yield of the ore milled was more than $100 per ton, the total bullion product of the district was only about equal to the cost of feeding its inhabitants.

I have repeatedly made similar calculations with similar results concerning mining districts in which rich material only was treated for gold or silver; and though I have not reckoned with regard to the Yukon territory, I feel quite sure that the same has been practically true here. One of the ladies of our party, returning from the brilliant excursion of yesterday and the day before, and receiving at the hotel the bill of a Dawson laundry, summed up the situation by saying, "The dirt here is certainly awfully rich, but the washing is awfully dear!" And an ingenious gentleman among us, of large diameter and corresponding surface-area, proposes to take his auriferous soiled linen out of the territory, just as it is, and have it treated at home by somebody who will accept as pay the amount of gold to be subsequently panned out of the washtub!

Seriously, what you need, first of all, is such a reduction of costs as will increase both the product and the profit of every man, whether laborer or prospector, or employer, in your community. The fundamental element—the auriferous area itself—you have in abundance. Even of the rich bonanzas you will, without doubt, discover many, rivaling those which you are now exploiting. There is cream yet to be skimmed from the top; but, if I am correct in my view, the cream will be chiefly valuable as showing you where milk is, whether in streams or in quartz! Of such milk, there is clearly a vast supply stored up for you; but to get it to market you must use what milkmen all over the world are reported to use, namely, water.

The water question is the burning question of the Yukon territory today. Nature has given you the means of solving that, also, and stands ready to assist you if you work with her. You can, if you choose, raise the water by main force to the level at which you need it. We have seen a magnificent sample of that bold defiance of Nature within the past two days. "C'est magnifique, mais ce n'est pas la guerre." It is splendid, but as a general proposition, it is not "biz." For water can be brought down more easily than forced up, and the water you want is not in the Klondike or the Yukon, but in those mountain streams which feed them.

In the great enterprise of utilizing that vitally essential element of a permanent industry, I feel sure that this territory will receive, as I think it fairly deserves, the encouragement and assistance of the government of the Dominion of Canada.

It would be unbecoming for me to volunteer suggestions as to government policy, but I may be permitted to define my own view. I am not a friend of so-called paternalism or State socialism. I think that, outside of the maintenance of law and order and the enforcement of contracts, the less a government has to do, the better.

Moreover, if I have read correctly the history of your country as well as my own, the attempt of the government to supplant private enterprise by directly executing great works for the good of particular industries, has not resulted so advantageously as to make us long for its unnecessary repetition. It may have been sometimes necessary, but it has never been in itself desirable.

On the other hand, your Government, like ours, occupies a double position. It is not only a sovereign, but also an owner of land from which it derives, through sale or royalty, a revenue. So long as the Dominion collects, as land owner, a percentage of your product, it may fairly be called upon to manage its own property with at least ordinary wisdom, and to facilitate and assist the increase of that harvest of which it receives a part.

I must frankly confess that my own government has thus far shown little of this wisdom in its administration of the Territory of Alaska, from which it has received much, and for which it has done less than it might wisely do. The Dominion Government and the governments of the Canadian provinces have been more liberal and far-sighted. Indeed, I am inclined to suspect that in some instances they have gone too far. But in spite of any such mistakes, if any there have been, the net results of Canadian policy are seen today in a solid advance which has surprised your warmest friends and surpassed your own prophesies.

In conclusion, gentlemen, let me urge upon you the importance of unanimity in pressing the just claims and supporting the vital interests of your Territory. The voice of a majority—even of a very large majority—is not enough for your need. A small dissenting minority—yes, even a single strident opposing voice—can work immeasurable mischief in the consideration by a distant executive government, or the discussion by a distant parliament, of proposals and requests affecting the interests of a newly opened, largely undeveloped and little-known region. If *you* cannot agree about yourselves, how can you expect remote strangers, however well disposed, to agree about you? I trust you will not deem me impertinent when I say that, in my judgment, any division among the citizens of the Yukon territory on the lines of political parties elsewhere—in Victoria, Ottawa or London—would be the height of folly. Why should anybody be "Conservative," for instance, in a country which has no past to "conserve," but only a glorious future to conquer?

On the other hand, if you act together, in warm—yes, white-hot—yes, *fluid*—unanimity, obliterating all distinctions of personal ambition or party politics, there is nothing you can properly desire which you will not irresistibly achieve!

Our generation has had an object lesson concerning the power of such unanimity, which we may well heed. We have seen the small nation of Japan victorious over a more powerful, but less enthusiastically united foe. I know of nothing in the history of war more wonderful than the skill, devotion, tenacity and patience which lately captured one of the strongest fortresses in the world. If there be a parallel, we must seek it in the annals of peace, a thrilling chapter of which records the conquest of this region by the dauntless and persevering pioneers of the Yukon and the Klondike. Be of good cheer! You have won your Port Arthur, and it now remains for you to make a permanent ally of that Nature which was at first your foe, and to arrange with her and with one another the wise terms of a permanent and profitable peace!

"Sun checks" in timber may be prevented from going farther by filling with linseed oil or "paint skins." Cavities that are likely to hold water should be filled with hot pitch (*not* tar).

Notes on Heat Insulation.

Despite the evident technical importance of the subject, very few measurements of the heat conductivity of firebrick and other materials used for furnace linings have been made.

R. S. Hutton and J. R. Beard have carried out a number of determinations chiefly with granular materials such as magnesia, carborundum, sand and firebrick, which were reported in a paper read before the Faraday Society, July 3, 1905. By adopting an apparatus devised by C. H. Lees and J. D. Chorlton, they have been able to measure the conductivity of such powders at temperatures up to 1,000° C. The chief results are summarized in the following table:

	Conductivity.
Sand (white Calais)	.00060
Carborundum	.00050
Firebrick	.00028
Lime	.00029
Magnesia (fused)	.00047
Magnesia (light calcined)	.00016
Infusorial earth	.00013

In order to compare the insulating power of these materials under conditions more nearly approaching those met with in practice, a small electrically heated tube-furnace was surrounded with the various granular powders. Measurements of the power expended and the temperature attained in the individual cases, showed the comparative value of the insulating materials examined.

From these experiments, an idea of the saving in heating costs, whether these are incurred in providing fuel or electric energy, which could be effected by a suitable choice of a furnace-jacketing material, may be obtained. Some of the best insulators are not suitable for really high temperatures on account of their shrinkage. Even under these conditions, however, they can often be used to advantage in conjunction with some more stable but less good insulator which serves for an interval lining of the furnace.

A New Induction Motor.

The Westinghouse type HX induction motor is designed for constant speed, and has no contacts between the supply circuit and the rotating element. The starting mechanism consists of a means for inserting resistance in the winding of the rotor when starting, cutting it out as the speed increases until the winding is short-circuited.

The stationary winding is disposed upon a built-up core of steel punchings secured between iron rings. Ring-oiling bearings are provided.

The rotor is bar-wound, the bars being inserted in partially closed slots. The overhanging tips of the teeth hold the bars in the slots. The end connectors are secured after the bars are in place and the leads are brought out through the hollow shaft to contacts in the starting device.

The motor is so designed that it may be used safely in the presence of inflammable vapor or dust-laden air.

They are built for two- and three-phase circuits in sizes from 5 to 50 h.p., for 25 and 60 cycles, and are wound for voltages from 100 to 400 for machines up to 20 h.p., and for 200 and 400 volts above 20 h.p. Their all-day efficiency is high, as they are efficient on light loads as well as at their rated capacity. The speed regulation is excellent.

Coke and Gas-Value of Coal.

BY C. BENDER.*

In publications dealing with the determination of the yield of coke obtainable from a given sample of coal, the statement is often made that the result of this determination at the same time furnishes the gas value of the coal (the sum of the coke and hygroscopic moisture being subtracted from 100, and the remainder put down as gas). But this method of figuring is quite unwarranted. The more oxygen a coal contains, the more water is formed in the dry distillation; moreover, the quantity of tar produced varies for coals of different origin.

The more recent a coal is, the more oxygen will it contain, and the more water will accordingly be formed during its dry distillation. Five different varieties of coal, on dry distillation, showed results as given herwith:

	Westphalian.	Saar.	Bohemian.	Saxony.	Bohemian Plate.
Coke	71.40	68.30	63 30	62.70	56.30
Tar	4.09	5.33	5.79	5.22	8.81
Gas-water	4.44	6.90	9.06	11.89	6.45
Gas	16.95	17.71	18.52	15.81	25.72
Difference	3.12	1.76	3.33	4.38	2.72
	100.00	100.00	100.00	100.00	100.00

According to the above figures, the gas value of these brands of coal varies between the limits 16.9—25.7%. If the gas value is calculated on the plan mentioned above [as 100 — (coke + water)], the following figures are obtained: Westphalian, 26.96; Saar, 29.70; Bohemian, 31.09; Saxony, 29.51; Bohemian Plate, 40.37. Or, putting the lowest actual gas-value, that of the Saxony coal, at 100, we have, as given herewith:

	Westphalian.	Saar.	Bohemian.	Saxony.	Bohemian Plate.
By experiment	108	112	117	100	163
By faulty calcul't'n.	91	101	106	100	137

It will be seen that, whereas, according to the actual yield obtained, the Saxony coal has the lowest gas-value, the value figured out by difference is lowest for the Westphalian coal. The difference between coke + water and the total 100% should not be put down as "gas," but as "volatile matter."

The alloy consisting of 90% copper, 6% tin and 4% phosphor tin (containing 5% of phosphorus) has been found the best for castings for hydraulic purposes. The addition of two parts of lead makes the metal cut easier, but the castings are sounder and more uniform without it.

*Translated from *Zeit. f. angew. Chem.*, 1905, No. 23, p. 883.

Forced Draft Versus Chimneys.

Messrs. Mills & Rowan, in their work on chemical technology, make the following statements regarding the subject of mechanical draft:

"The principles of what is now becoming well known under the name of "forced combustion" have been repeatedly advocated during past years by those who have devoted thought and study to the subject. The position assumed by them —which is now finding favor among engineers—has been, in brief, that the air supply required for combustion in furnaces can be more economically furnished by mechanical power than by the action of chimneys; and that the mechanical method has other advantages, which enable it to be preferred to the one which is older but more imperfect. One of these advantages is the higher temperature of combustion, which is equivalent, with a boiler of good design, to an increased evaporative power of the boiler, or to increased evaporative effect for the fuel. Another advantage, which has not been fully realized in any plan as yet introduced in practical work, is that the rate of travel and escape of flame and hot products of combustion are under control. It is thus possible to cool them more completely than can be done when chimney draft is used, and this means a saving of heat which would otherwise be uselessly dissipated.

"Mechanical or artificial draft thus presents to us a method of economically furnishing the air supply to furnaces and producing a more efficient combustion temperature, while it also renders possible further economies due to retarding the movement and escape of hot gases, and to preliminary heating of the air supply by waste heat or otherwise."

According to E. L. Harris (*Daily Consular and Trade Reports*, July 21, 1905), 12,000 natives are employed in the diamond mines at Kimberley, and all those who come in actual contact with the precious stones are confined in compounds. The greatest precautions are taken to guard against what is called "leakage." The "boys" who labor in the mine are engaged by contract for varying periods, from three months to a year; during this time they are not permitted to leave the compound, which is connected by a covered way with the mine. A bonus of 50c. per carat is paid for stones found, and some finds produce as high as $50. The compound is surrounded by wire netting to prevent the boys from throwing diamonds to accomplices outside; at the termination of their contract they undergo a rigorous search. The average wage is about $1 a day, and it costs laborers about $1 a week to live.

According to H. O. Hofman, zinc blende ignites at 600° C.

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EDITORIAL.

THE REPORTS FROM the Joplin district last week indicate the wildest market for zinc ore that there has been since 1899. This is chiefly due to the shortage in the ore supply occasioned by the recent floods, together with the situation in the spelter market, which has compelled the smelters to bid high for the raw material.

THE COPPER MARKET continues to manifest great strength. Demand appears to have outstripped supply, temporarily at least, and there is a shortage of metal available for prompt delivery. There has been a steady increase in price, and the prospect appears to be toward still higher quotations.

Electrical Gathering Locomotives.

Mechanical gathering of coal is rapidly supplanting animal power in the mines of the Delaware, Lackawanna & Western Railroad's Coal Department. The successful outcome of trials with electrical gathering locomotives during the last two years is evidenced by a recent order for 15 additional similar locomotives by this company, making 27 in all. The maximum grade in chambers surmounted by these locomotives in the D. L. & W. practice is 14%. An empty car is pushed to the face of the chamber and when loaded, is spragged down to the gangway. There is some danger of the wheels of the locomotive skidding on descending this heavy grade. The old locomotives weigh 6½ tons, and the new ones 5½. Each class has the same motor equipment. Six or seven mules are replaced by each locomotive.

The Elmore Process for Diamond Recovery.

The extraction of diamonds from the gravel in which they occur in South Africa has been for a long time effected by greased tables, to which the diamonds adhere, while all other minerals are washed off. When the grease, which is of a particular kind, is removed and melted, the diamonds sink to the bottom of the pot. The process is of high efficiency, tests having showed that only 0.25 to 1.68 per cent of the diamonds, by weight, passed off in the tailing from the table. The separation is effected by means of the property of adhesion. The Elmore process of oil concentration also operates by virtue of that property of certain minerals with respect to oil. It was natural, therefore, that its application to the separation of diamonds should be investigated.

The experiments have resulted very successfully, practically 100 per cent of the diamonds being recovered, and the process has now been adopted by the Premier Diamond Mines, which intends to erect immediately a plant capable of treating 800 tons of gravel per day. The company is at present treating 1,500 tons per day by the pulsators and grease boards.

It is thought that the Elmore process will materially reduce the cost of treatment and afford a higher extraction of the gems. It certainly should make it easier to protect the gems from theft. It is a highly interesting application of this ingenious process, which has more merit than it has yet been credited with.

Salt Lake as a Smelting Center.

The Salt Lake valley was the earliest important metallurgical center west of the Rocky mountains, considering such a center to be a natural focus to which the ores of various kinds, produced in different districts, can be brought for economical smelting. In the first days of systematic mining in Utah, attempts were made to smelt locally at Bingham, the Cottonwoods and elsewhere, but it was soon learned that it was more advantageous to transport the ores to a common point, where they could be suitably combined, and ever since then Salt Lake has remained the metallurgical center of Utah. Since it became possible to mine and smelt profitably the cupriferous ores of Bingham, it has become one of the most important metallurgical centers of the United States, and it appears destined so to continue for a longer time into the future than can now be foreseen. The confidence in the supply of ores which furnish the basis for such an industry is manifested in the highly expensive character of many of the works that have been erected there and in the readiness of their owners to make improvements in them.

Salt Lake was always a favorable point for smelting, commanding at near range the important mining camps of Bingham, Park City, Alta and Tintic, which could furnish large tonnages of galena, silicious and basic oxidized ores. At certain

times there has been shortage in the supply of iron flux, but that is no longer a drawback. The mines, especially those of Bingham, Park City and Tintic, are of large capacity and their limit has evidently not yet been reached. Only four or five years ago it was feared that the smelting capacity was being overbuilt, and that the competition of the copper smelters would seriously affect the lead smelters with respect to certain classes of ore capable of treatment by either process. Instead of that, a new lead smelter and a new copper smelter have been erected, in addition to the plants then building, extensions have been made to the older plants, and a new works, to surpass any of the others, is now planned. Upon its completion there will be five large copper smelters and two lead smelters in the valley. A noteworthy feature in the practice is the fact that, with a single exception, these are operated by mining companies, which have assured the supply of the essential ores, pyritous and silicious, and are therefore independent, although there is developing a healthy competition among certain concerns for some miscellaneous ores.

New Discovery at Sutter Creek.

The most interesting piece of news for a long time relating to the Mother Lode region of California is that of the discovery of ore at a depth of 2,000 feet on the line between the Lincoln and Mahoney mines, Sutter Creek, Amador county. The attendant circumstances make the strike of particular importance, proving the existence of good orebodies at great depths in the Sutter creek section, the same as they have been found at other mines at Jackson, a few miles distant.

The Wildman and Mahoney mines, worked under one management, were for a long time productive and profitable, but recently have been in difficulties and debt, and in fact were closed for a period. There are two 40-stamp mills on the property. The owners of the mines were for a time prevented by those holding the mortgage from operating the mills, on the ground that the mines would be "gutted." Mr. John Ross, Jr., the manager, finally obtained funds with which to go ahead.

The Lincoln mine, the shaft of which is about 1,000 feet from the Mahoney, after five years' work and the expenditure of about $200,000, was finally closed down, nothing of value having been found. This, together with stoppage of work at the Baliol, not far off, was a serious setback to the community; and these circumstances, combined with the bad luck of the Wildman-Mahoney, made many empty houses in the pretty foothill town of Sutter Creek.

Mr. Ross then obtained a lease and option on the Lincoln mine, and started to exploit the Mahoney through the Lincoln shaft. The Mahoney and Wildman are connected by extensive underground works. The plan was to run a drift from the bottom of the Lincoln shaft—2,000 feet—to come under the Mahoney ground at that depth and below its present workings.

The matter of the underground formation in that locality is a subject of moment to all miners on the Mother Lode, and was discussed by mining engineers and superintendents in all its bearings. Some felt sure ore would be found in the Lincoln, and others thought differently. Mr. Ross unwatered the shaft and began his drift on the 2,000-foot level of the Lincoln, running it diagonally to get under the Mahoney shaft. Operations have been watched with great interest, and now comes the news of the strike at a point about 1,000 feet from the Lincoln shaft, near where the drift reaches the boundary of the Mahoney claim. At that point they cross-cut east and west, and in the east cross-cut encountered ore in narrow seams. These gradually widened to a vein of 26 feet, which is now found to be 50 feet in width, carrying $4 to $6 ore. In which ground the apex is has not been determined, and it would not be a surprise if litigations were to ensue. Several of the claims surrounding this ground were taken in the townsite of Sutter Creek, and are owned by the Wildman-Mahoney company, but others are in the possession of other parties. Altogether, the strike is noteworthy as an example of courage, persistence and good judgment in prospecting; and in developing new interest in a famous, old mining camp.

Copper Smelting at San Francisco.

The American Smelting & Refining Company, which lately acquired the plant of the Selby Smelting & Lead Company, adjoining San Francisco bay, is endeavoring to obtain another site on the bay shore, where it intends erecting a copper smelter of 1,000 tons daily capacity. Several places are under consideration. The location of the present Selby smelting plant, near the entrance of Carquinez Straits, is one where there is little room for enlargement, except by filling in the flats on the bay shore, and even there the space is circumscribed. Moreover, the farmers to leeward are bringing suits for damage from fumes.

For about seven or eight months in the year the trade winds of the Pacific blow continuously in the same direction, and the smoke and fumes are carried over practically the same area. The ranchers complain of loss of stock, but thus far have not been able to prove that their horses and cattle have been injured by the fumes. Their action in bringing suits, however, is a menace to further enlargement of the works on the present site. By selecting a site for the new smelter on the western shore of San Francisco bay, the Selby company would have from five to seven miles of salt water between it and any cultivated land.

The fume question, in its bearing upon agriculture and grazing, is important to the smelters in many parts of the United States, in view of the increasing complaints of the owners of property which is affected by them. These complaints are often unjustified, but also are often meritorious. Without venturing at this time to discuss the merits of any case, it may be said that the complaints are indicative of the change in conditions at various industrial centers, and foretell the day when American smelters may be required to render innocuous the fumes from their works, as they now must do in Germany and elsewhere in Europe. It is especially satisfactory when that can be done so simply as it appears it can be at San Francisco, in so far as the new plant is concerned.

An interesting question, of a different character, with respect to this new plant is the matter of copper ore supply. There are hundreds of unworked claims in California, and others that are productive; but many of them are far off in the mountains, remote from transportation facilities. There are many undeveloped copper properties, for instance, in the vicinity of Taylorsville, Plumas county; but there has been no production as yet, nor will there be until the Western Pacific Railroad, now under construction, is completed. Some ore comes from Fresno and Mariposa counties, and a little from other

localities, but the total does not amount to much outside of Shasta county, where the principal mining companies have their own smelting furnaces.

The most productive copper mine in the State, except the Mountain and Bully Hill, of Shasta county, is the Daisy Farm, recently opened in Placer county. This has just been acquired by the Guggenheim interests, probably in anticipation of the establishment of the new copper smelting plant. Ores from the Southwest, from Nevada and from Mexico will also be worked at the new plant, and aside from ocean transportation, the lines of the Southern Pacific, Santa Fé and Western Pacific will act as feeders.

The Semi-Centennial of the Sault Ste. Marie Canal.

The celebration, at the Sault Ste. Marie, of the fiftieth anniversary of the completion of the canal around the falls of the St. Mary's river, took place on August 2 and 3. Although the arrangements were in charge of a committee drawn from the chief towns of the Lake Superior region, it had an international character, official delegations from the Canadian and Ontario governments and from Canadian commercial bodies taking part in the proceedings. The celebration, and the erection later of a monument as a permanent memorial, were made possible by the appropriation of $10,000 by the United States and $15,000 by the State of Michigan, and the contribution of a considerable amount by the shipping interests of the Great Lakes.

The canal was completed and opened on June 18, 1855, the first vessel to pass through from Lake Huron to Lake Superior being the steamboat *Illinois*. The early days of August, however, were chosen for the commemoration, as being the most convenient time.

The ceremonies were attended by a large number of persons from all parts of the Lake country. Mr. Charles T. Harvey, engineer of the first canal, was present and acted as chief marshal. The proceedings on the first day were chiefly spectacular, consisting of a military parade on shore, a parade of vessels on the water, Indian games and the like. Both the American and Canadian towns were decorated, and were brilliantly illuminated at night.

On August 3 the day was given over to the commemoration exercises. Most of the addresses were interesting, but the feature of the day was the historical address by Peter White, the "father of the Lake Superior country." Mr. White spoke at length on the history of Lake Superior commerce and the development of the country, in which he has had a prominent part.

It is a fact not generally known that the canal, the semi-centenary of which was celebrated last week, was not the first at the Sault. About 1796, the Hudson Bay Company built a sluiceway or channel around the falls on the Canadian side, to pass loaded bateaux. This had a lock 38 ft. long and 9 ft. wide, with a lift of about 9 ft. It was destroyed in 1814 by American troops from Mackinac. The remains of this old lock were found a few years ago, in putting in the foundations for some of the buildings of the Lake Superior Corporation; aid being given by the historical researches of Judge J. H. Steeve, of Michigan.

The first canal at the Sault, which was completed in 1855, had two locks, each 350 ft. long, 70 ft. wide and 11½ ft. deep over the miter sills, with a lift of 9 ft. each. They were designed by Charles T. Harvey—who is still living—and their size made them notable engineering works for that day. The canal approach from the Lake Superior side was 5,700 ft. long, 13 ft. deep, 100 ft. wide at surface and 64 ft. at bottom. The whole work was completed in 22½ months, and cost $999,802. It was built by the St. Mary's Falls Ship Canal Company, and paid for by a grant of 100,000 acres of land, which Congress had made to the State of Michigan for that purpose. The canal remained the property of the State for 26 years, until 1881, when it was transferred to the United States Government. Long before this, however, the improvement of the St. Mary's river had been undertaken by the United States, and the original locks having been found insufficient for the growing trade, a new lock had been designed and work begun upon it. This lock—known as the Weitzel lock, from the engineer in charge—was a single lock, 515 ft. long, 80 ft. wide, 17 ft. deep over the sills, with a lift of 18 ft. This was, at the time, the largest lock in the world, and its design—especially the high lift—was sharply criticized by many engineers. Nevertheless, it passed the traffic for 15 years successfully, and is still in use.

In less than 10 years, however, it was found to be too small, and a new lock—known as the Poe lock, from Gen. O. M. Poe, the engineer who designed and built it—was begun, and finally completed in 1896. This lock is 800 ft. long, 100 ft. wide, 21 ft. deep over the sills, and, like the Weitzel lock, has a lift of 18 ft. To make room for its construction, it was necessary to remove the original locks of 1855, which were then still in existence. The power for operating the locks is obtained from the falls of the St. Mary's river, and the machinery used is the best of its kind in existence. The Poe and the Weitzel locks are both in daily use, and are both needed.

About the time the Poe lock was designed, the Canadian Government decided to build a canal on its side of the river. This was completed and opened in 1895, the lock being 900 ft. long, 100 ft. wide and 21 ft. deep. Both the American and the Canadian canals are free to all vessels.

In the first year of its use the old canal passed vessels carrying 106,296 tons of freight. In 1881 the total was 1,567,741 tons; in 1896 it was 16,239,061 tons. From the beginning, a large proportion of the freight passed was iron ore, and great impetus was given to this traffic by the opening of the Minnesota iron ranges. In 1902, the year of maximum trade, the total freight passed through the two canals was 35,961,146 tons. The years 1903 and 1904 showed some decrease, but the present season has, so far, been extremely active, and there is little doubt that the total will be over 37,000,000 tons. This is nearly three times the traffic carried by the Suez Canal in its best year.

The depth of 21 ft. in the locks accords with the maximum draft at present possible on the Lakes. But the improvements already begun at the St. Clair Flats, and at the Lime Kiln Crossing in the Detroit river, will permit the passage of those limiting points by vessels of 23 ft. or 24 ft. draft; by that time another lock will be needed at the Sault, and plans for it are already being made. The largest vessels now in use carry from 10,000 to 11,000 tons of iron ore; an addition of 3 ft. to the draft will mean an increase of 2,500 to 3,000 tons to a cargo. Vessels carrying 15,000 tons of ore, or 12,000 tons of coal, are not beyond the possibilities.

Metallics.

An excellent caulking tool for leaky rivets in tanks can be made by grinding down the cutting edge of an old flat chisel. The tool should be tempered to a deep purple.

Antimonial lead ordinarily contains 25 to 30% Sb. The percentage of antimony may be increased to 60 if desired, but 25 to 30% best suits the market requirements.

Angle valves, as used for small pipe lines, should be set in the "reverse" position, or so that the packing around the stem can be removed without opening or closing the valve.

"Four-cycle," as used in referring to gas-engines, indicates the number of strokes of the piston necessary to complete a full cycle or sequence of operations in the cylinder.

The most objectionable of the ordinary impurities in desilverized lead for corroding purposes is bismuth. Lead refined by the Pattinson and electrolytic processes is superior in that respect.

Asphalt floors can be used without damage from acid solutions in lixiviating processes; but if the temperature is liable to rise above 95° F. they cannot be depended on, even where not subject to such solutions.

In roasting zinc blende in a reverberatory furnace, with good coal, a combustion of 5 to 7.5 lb. per sq. ft. of grate per hour is ordinarily required, but under unfavorable conditions 10 to 12 lb. may be necessary.

Automatic flood gates on the crest of a dam should be pivoted at a point a little less than one-third their height above the crest. When a freshet reaches the top of the flood gates, the pressure is sufficient to overbalance and open them.

The "Page effect" is the name by which the sound produced by the rise and fall of voltage in alternating-current systems is known. It sometimes is so pronounced as to give the impression of a musical note of definite, though varying, pitch.

The new electric hoists at Conneaut, O., have made a record by unloading 10,514 tons of iron ore from the steamer *George W. Perkins* in 4 hrs., 14 min. The ore was handled at the rate of 2,484 tons per hour, or a little over 41 tons per minute.

The most economical type of bin or pocket to construct (when its capacity is considered) is that formed with a surcharge, the inclined surface from foot to point of which is of the same length as the vertical height of the side bulkhead.

Owing to the trouble of preparing the sodium sulphide solutions necessary for electrolyzing antimony solutions by the method of Classen, H. D. Law and Dr. F. Mollwo Perkin recommend the use of a solution containing ammonium tartrate, which they have found to give very satisfactory results.

Galvanized wrought-iron pipe and fittings over four inches in size are so costly, compared with the protection that galvanizing affords, that they are rarely used. Spiral-riveted pipe is less costly, as galvanizing may be done before riveting up; but even here the expense of coating the fittings is high.

For spans of less than 100 ft., the Howe type of bridge truss can be built cheaply and durably of timber. The points where failure is most apt to occur in any exposed timber structure are the joints, and these should be coated with linseed oil or hot pitch. Ordinary whitewash is an excellent preservative.

Acetylene may be stored under pressure for portable lighting and it may be absorbed in acetone and used for the same purpose. It is so used now under the first method in about 300 cars now lighted by the Pintsch system of gas storage. The second system is being experimented with and is making some headway.

A tight rivet, in steel construction, is not necessarily better than one which does not give the tight sound on the hammer test. The heads only of the first may be in full contact and the shank not have been upset enough to bear, and the rivet that "sounds loose" may have full bearing contact over its entire shank.

The Palmarejo mines, Chihuahua, Mexico, are connected with the mill by a railway, of 30-in. gage, 12.5 miles long. The line is laid with 25- and 35-lb. rails. The maximum grade is 4.5%. A 22-ton locomotive hauls 14 cars, and an 18-ton locomotive hauls nine cars, the cars being of 4.5 tons capacity. Ordinarily a round trip is made in 4 to 4.5 hours.

An efficient belt shifter consists of a pair of rollers mounted on a common shaft on either side of a central pivot and arranged to be operated by raising the shaft end; this device may be placed over the tight-and-loose pulleys on any belt-driven machine, and saves wearing the edge of the belt. The rollers should have their ends extended a few inches beyond the edge of the belt.

Chimneys higher than 150 ft. are very costly, the expense of construction increasing in much greater ratio than the height. The increased cost is rarely justified by the increased efficiency. This refers only to the chimney as a draught-producer. As a means for dispersing noxious fumes high in the atmosphere, an extraordinarily tall chimney is sometimes to be recommended.

Theoretically the electromotive force of any element is obtained by multiplying its electro-chemical equivalent by its thermo-chemical factor, expressed in dynamic units. The trouble in checking this up practically is that in a galvanic battery, or its equivalent, there are many varying factors; between every gas, liquid and solid there is a tension which acts as a component, plus or minus, of the final electro-chemical voltage in question.

The relative affinities of the chemical elements are closely connected with their respective atomic volumes; the larger the volume, other things being equal, the greater the affinity. A clear notion of this "atomic volume" may be gotten by dividing the atomic weight (of the element in question) by its "specific gravity in the solid state"—that is, by dividing the total weight of the atom by the weight of unit volume, we get the relative number of volumes occupied by the whole atom. The active elements, like the alkaliferous metals, and the halogens, have large atomic volumes.

The middling produced by a jig or slime table should not ordinarily be returned to the same machine. Material which has already been treated by a good machine, and produced as middling, will chiefly appear as middling in a second treatment, and it is ridiculous to require such a machine to do the same work twice. The essence of ore dressing is to recrush middling before attempting to retreat it. Most rules, however, have their exceptions, and there are certain machines, operating on a hit-or-miss principle, wherein certain particles (which ought to have been separated) may escape action on the first attempt, but may be properly affected on a second.

Svante Arrhenius, whose name has recently come prominently into geologic theory, is the Swedish student who definitely formulated, in 1887, the modern solution theory of ionic dissociation of molecules. His further theory, that the material in the depths of the earth is at a temperature above its critical point, must be studied long and seriously by geologists. The theory is not new; it is only a modification to the conditions of the earth, of the general theory of the physical structure of the sun and stars.

There are two rival theories as to the origin of natural oil and gas. One (the organic) is that the products in question are the results of the decay and distillation of organic matter contained in the rocks; the other (the inorganic) is that the oils and gases are the results of the re-action between descending water and metallic carbides in the depths of the earth. These metallic carbides are supposed to exist in the deeper layers and it must be said that there is much in their favor. Most practical men adhere to the "organic" origin of oil and gas. Probably most chemical geologists would accept a theory uniting the inorganic and organic explanations.

Colliery Notes.

In screening anthracite coal, the shaker type uses three screen segments, while the rotating circular screen of the same capacity has 48 segments.

Long-wall mining in Iowa is generally carried on as long-wall advancing. The conditions of mining vary according to the character of the coal-bed and the adjacent strata.

A convenient arrangement in a colliery stable for watering stock is to have a water-box in each stall connected with a supply-pipe and a waste-pipe, each connected with its respective main. The water-boxes can all be filled or emptied at one time by means of valves.

To produce good coke in bee-hive ovens, located on hill sides, where water may find its way into the oven, good drainage should be provided. Porous tile-pipe, or a loose rock drain, should be carried back of and along the length of the ovens. If the floor is damp, black ends will result in coking

An exhaust fan is generally preferred to a force fan in the ventilation of a gaseous mine. The haulage can then be carried on in the intake airway, and a better arrangement of doors can be obtained. Also the gas escaping from old workings will be drawn out. In case a force fan were used, the gas might accumulate in old chambers or rooms.

In undercutting anthracite beds, one of the chief difficulties encountered at the mines where it was tried was in taking care of the dust made by the machines. The fine, dry dust filled the air, making unbearable conditions for the workmen. As a rule, anthracite beds are on too great a pitch to permit of working power undercutting machines.

In coke manufacture in bee-hive ovens, successful management will point up the front and end walls at regular intervals. Cracks around the oven doors, in particular, lead to waste of coal in coking. Air finding its way into the oven through these cracks can be traced by an excess of ashes near the front of the oven, showing where the coke has been burnt out.

The cost of stripping coal in the Lehigh region of Pennsylvania has been reduced 50% in the last 15 years as regards rock. Recently contracts have been taken out at 25c. per cu. yd. for rock, 14c. for earth, and 9c. for coal dirt. Fifteen years ago to remove solid rock cost 50c. per cu. yd., loose rock 35c., and earth 18c. Today loose rock classification is largely obsolete. The current prices may vary slightly from above figures, as they are based on a sliding scale depending on rates for labor.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

FINES IN PYRITE SMELTING.

The Editor:

Sir—In this JOURNAL (June 9, 1904), in his review of contributions on pyrite smelting, Edward D. Peters writes in part as follows:

"The presence of a considerable proportion of fines in the charge is mentioned by several of the contributors as being objectional, as, indeed, it certainly is in ordinary blast-furnace smelting. In pyrite smelting it may be particularly dangerous in cases where the silicious proportion of the charge is comparatively coarse, while the raw sulphides exist in the shape of fines. Under such circumstances, the sulphide fines will trickle down through the interstices of the charge, and, owing to their fusibility, melt into matte without remaining long enough in the oxidizing atmosphere above the tuyeres." As one of two remedies for such conditions, Mr. Peters suggests:

"Fusing into an iron matte in a large reverberatory furnace. The capacity of such a furnace, running on raw sulphides, is enormous, while the fuel consumption is very small; and, as the main result of this operation is simply to change the FeS_2 into FeS, there is comparatively little loss in heat-producing constituents. The weight of the raw sulphides is considerably reduced, and the resulting iron matte forms a valuable fuel and flux in lump form. The fact that it makes no flue-dust, when added to the blast-furnace charge, also tends to reduce the cost of this reverberatory fusion."

Many pyritic metallurgists have not yet satisfied their desires to blow tremendous volumes of air through their furnaces; claiming, as they do, that the improvement in ratio of concentration, with heavy sulphides, is to a great extent dependent upon the amount of air used. With the increased volume of air, there is produced an increased quantity of flue-dust, especially with fines on the charge. And there is also the question of the fines smelting away from the coarser portion of the charge, leaving a silicious skeleton in the furnace.

The smelting of sulphide fines with coarse silica and limerock, in blast-furnaces, has always been a delicate subject. But with the recent practice of increased volume of air, it is becoming serious.

In order to avoid the cost of roasting (preparatory to reverberatory smelting, as commonly practiced), Mr. Peters' suggestion to fuse the raw fines in the reverberatory would appeal to many as the proper remedy. But, unfortunately, the literature on the subject is very scanty; and it is the purpose of this inquiry to bring before the readers of this JOURNAL such information as Mr. Peters and others may feel disposed to furnish. Metallurgists in general, and especially those who have encountered the conditions here noted in the blast-furnace, can throw further light on the subject, and it will be very welcome.

F. N. FLYNN.

Mexico, D. F., July 24, 1905.

PYRITE SMELTING.

The Editor:

Sir—In looking over my letter in the JOURNAL of Feb. 2, 1905, page 238, second column, line 28 from bottom, I notice an error which should be corrected. The statement should read:

0.33 Fe S at 1.29 Cal.	.....	0.43 Cal.
0.12 S at 2.2 " at $\frac{1}{5}$	.....	0.09 "
Hot Blast	.....	0.10 "
		0.62 Cal.

LEWIS T. WRIGHT.

San Francisco, Cal., July 17, 1905.

MAC DOUGALL ROASTERS.

The Editor:

Sir—Your statement in a recent editorial (this JOURNAL, July 22, 1905, p. 114) "On roasting furnaces in copper metallurgy," that the Mac Dougall type of roasting furnace was first introduced on a large scale at Butte, Mont., is not, I believe, correct. This type of furnace, with water-cooled arms and detachable rabbles, and which has worked a revolution in the art of sulphide-ore roasting, was invented, developed and put into large-scale practice by me at Keswick, Cal., in the year 1897, where it has since been extensively used.

LEWIS T. WRIGHT.

San Francisco, Cal., July 28, 1905.

LOUISIANA SULPHUR.

The Editor:

Sir—In No. 28 of the *Zeit. f. angew. Chem.*, Professor Lunge publishes a correction with reference to the article on the Louisiana sulphur deposits (see this JOURNAL, July 22, 1905, p. 97). The statement "Louisiana even now produces more than two-fifths of the world's sulphur" should read, "over two-thirds," etc.

ALFRED J. LOTKA.

Laurel Hill, Borough of Queens, N. Y., July 27, 1905.

The Berlin Testing Bureau (Materialprüfungsamt) has grown so that it has removed from Charlottenburg to Gross Lichterfelde, another suburb of the Prussian capital. This bureau has grown to a staff of 138 persons, and the equipment and support are generous. The departments include: Metal testing (Prof. Rudeloff); building material (Prof. Gary); paper testing (Prof. Herzberg); metallography (Prof. Heyn); chemistry (Prof. Roth); oil testing (Prof. Holde); and Prof. A. Martens as director.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Finley Gulch District, Colorado.

Sir—I have just returned from the Finley Gulch mining district in Saguache county, Col. This new camp is 9 miles from the town of Saguache, the road being one of the best I have ever seen in a mining district; the grade is gradual and unnoticeable, on account of the camp being only about 1,500 ft. above the level of the San Luis valley. The altitude of the valley itself is 7,500 feet. The slopes of the hills are well wooded; there is plenty of water, and nature seems to have provided everything for a model mining camp. The district is well mineralized; rich float rock has been picked up from the various hills. There appears to be a large dike running across the ridge. Many rich fissure veins appear, composed of hard "porphyritic quartz," honeycombed, oxidized and highly crystallized; they are contained in andesite and porphyry. In these rocks considerable free gold and tellurium are to be found. These veins show large value even at a depth of 15 to 20 ft. Up to the present there has been little work done, with the exception of a 100-ft. shaft on a claim called the "Davis." This claim showed good value from the surface down, although the shaft was sunk 30 ft. off the vein; a spur was encountered during the work, which contained ore running as high as $40,000 gold per ton and some silver. The claim next in any considerable content is called the "Klondike." There is a 165-ft. shaft on this claim; it shows 5 ft. of ore, running $53 per ton, 1 ft. of which carries $1,000 per ton gold and silver. The "New Jersey" claim also has a 40-ft. shaft, which shows large value, averaging over $600 gold and silver.

In fact the district shows every indication of large bodies of rich ore. I expect to see, in a short time, a large and rich mining camp here. Old prospectors and miners who are now in there say that it will be a second Cripple Creek. It is only 23 miles from the D. & R. G. R. R. over an excellent adobe road. Everything is favorable for the opening of a good camp. Without optimism I can reasonably say that before another year shall have passed, Colorado will hear more of it. I understand the Saguache Mining Co. is going to start immediately developing its property in this camp. It expects to commence shipping ore some time this summer or fall. Much more might be said regarding the Finley Gulch mining district, but I will leave that for some other disinterested person.

A. MAC KINNON.

Saguache, Col., July 28, 1905.

New Books.

Bulletin of the Bureau of Standards. S. W. Stratton, Director. Vol. I, No. 1, 1904. Vol. II, No. 2, 1905. Department of Commerce and Labor. Government Printing Office, Washington, D. C.

Rural Valley (Penn.) Folio. By Charles Butts. Pages of letter-press 11, with 6 sheets of maps, sections, etc. This is Folio No. 125, of the Geologic Atlas series. The United States Geological Survey, Washington, D. C.

A Guide Book for the use of Prospectors in New South Wales. Issued by direction of the Honorable S. W. Moore, M P., Minister for Mines and Agriculture, Department of Mines. William Applegate Gullick, Sydney, N. S. W., 1905.

Inhalts-Verzeichnis (Index contents) of *Gluckauf* for the years 31 to 40 (1895-1904) Essen, Germany, 1905.

It is a pleasure to note the receipt of this painstaking summary of the contents of the last ten years of this standard German journal of mining and metallurgy.

Centrifugal Fans. By J. H. Kenealy. Spon & Chamberlain, New York, and E. & F. N. Spon, Ltd., London, 1905.

Contents—Flow of air; Vortex; Fans; Fanwheel; Capacity; Pressure; Work; Horse-power; Efficiency; Exhausters; Housing; Cone wheels; Disk fans; Choosing a centrifugal fan.

Geology and Paleontology of the Judith River Beds. Bulletin No. 257, United States Geological Survey. By J. W. Stanton and J. B. Hatcher; with a chapter on the Fossil Plants by F. H. Knowlton. Pages, 174; with many illustrations and index. Government Printing Office, Washington, D. C., 1905.

Die Fabrikation der feuerfesten Steine (The manufacture of refractory brick.) By Friedrich Wernicke. Pages, 107; without index. Julius Springer, Berlin, 1905.

The contents include chapters on: (1) Dinas brick (silicious or Welsh); (2) Chamotte brick ('Chamotte' is binding clay); (3) Bauxite brick; (4) Melting crucibles; (5) Magnesite brick; (6) Carbon brick; (7) Dolomite brick; (8) 'Pudding-,' Glenboig- and Carborundum-brick; (9) Refractory mortar; (10) Transportation of refractory material.

The Mining and Quarry Industry of New York State. By David H. Newland, B.A., Assistant State Geologist. Bulletin No. 93 and Economic Geology No. 13. New York State Museum, John M. Clarke, Director. New York State Education Department, Albany, 1905.

Contents—Preface; mineral production of New York in 1904; cement; clay; manufacture of building brick; other clay materials; pottery; crude clay; emery; feldspar and quartz; garnet; glass sand and molding sand; graphite, gypsum; iron ore; millstones; mineral paint; mineral waters; carbonic acid gas; natural gas; petroleum; pyrite; salt; slate; stone; granite; limestone; marble; sandstone; trap; talc; zinc.

It gives us pleasure to note this timely and practical pamphlet by Mr. Newland, who was formerly an efficient and congenial associate on the editorial staff of this JOURNAL.

Hydraulic Tables. By Gardner S. Williams and Allen Hazen. John Wiley & Sons, New York. Chapman & Hall, Ltd:, London, 1905. $1.50.

Contents—Formula used; Observations; Tables of flow; Aqueducts; Sewers; Tile sewers; Circular brick sewers; Decrease in carrying capacity; Comparison of results; Metric pipe table; Venturi meter; Underdrains for sand filters; Flow over weirs.

One of the sets of tables most desired by engineers, and heretofore not accessible, is at last available in the handy form shown by this book. The tables are excellent, and, coming from the authorities that they do, are necessarily accurate; the typography is good, and the size (6 by 9 in.) convenient. We have not often the pleasure of commending so complete a set of tables—the only criticism we have to make being on the style of type selected; it is of a form that, in constant use, may become extremely trying to the eyes.

Methods and Costs of Gravel and Placer Mining in Alaska. By Chester Wells Purington. Bulletin No. 263, United States Geological Survey, Charles D. Walcott, Director. Government Printing Office, Washington, 1905.

Contents.—General conditions; prospecting; water supply; open-cut mining; drift mining; hydraulic mining; dredging; sluices and gold-saving appliances, excluding hydraulic operations; cleaning, retorting and melting; fineness of gold; labor; lumber and fuel; roads and road building in Alaska; freight rates; customs regulations; telegraph rates; tables of distances and prices of mining supplies; legal conditions in 1904; bibliography.

This is a highly valuable publication. It is practically a treatise on placer mining, having especial reference to the conditions existing in Alaska, and it is entirely up to date. Mr. Purington's work is highly creditable, and he is to be congratulated upon contributing to the industry so useful a book, which will be particularly appreciated by his professional confréres.

Proceedings of the American Institute of Electrical Engineers. Vol. XXIV, No. 7, July, 1905.

Contents—High-power surges in electric distribution systems of great magnitude, Charles P. Steinmetz. Comments on remarks made by Colonel R. E. B. Cromp-

ton before the International Electrical Congress at St. Louis, John W. Howell. Water-powers of the Southeastern Appalachian region, Frederick A. C. Perrine. A new carbon filament, John W. Howell. Alternate-current machinery and induction alternators, William Stanley, assisted by G. Faccioli. Note on a simple device for finding the slip of an induction motor, Charles A. Perkins. Notes on the power-factor of the alternating-current arc, Geo. D. Shepardson. Eddy currents in large slot-wound conductors, A. B. Field. Data relating to electric conductors and cables, H. W. Fisher. An experimental study of the rise of potential on commerical transmission lines due to static disturbances caused by switching, grounding, etc., Percy H. Thomas. Constant-current mercury-arc rectifier, Charles P. Steinmetz. Synchronous converters and motor-generators, W. L. Waters. The organization and administration of national engineering societies, John W. Lieb, Jr. (President's address). Light electric railways, James R. Cravath.

Western Mill and Smelter Methods of Analysis. By Philip H. Argall. Denver, Col.; Industrial Printing & Publishing Co. Pages, 124. Price, $1.50.

Contents.—Standard solutions. Slag analysis. Ores. Coal and coke. Other methods of analysis. Cyanide process, daily work. Estimation of oxygen in working cyanide solutions. Ore testing by the cyanide process. Analysis of bronze and bearing metals. Refinery methods. The laboratory.

It is a pleasure to welcome the appearance of this practical little volume, which is essentially a revision and enlargement of an earlier edition. The author's directions are clear and authoritative, for few writers on commercial analysis have had such a varied and successful experience as Mr. Argall. He does not assume to cover all the branches of the theory and practice, but he gives what he has used, and what he knows to be useful in actual work. For this reason the book will appeal strongly to the guild of mine, mill and smelter chemists all over the world. We commend the book heartily, and predict for it that success, large and lasting, which is based on simple merit.

Civil Engineering. By Lieut.-Col. G. J. Fiebiger, U. S. A. New York, John Wiley & Sons. London. Chapman & Hall, Ltd. Pages, 573; illustrated. Price, $5.

Contents.—Classification of stresses and longitudinal stress. Shearing and torsional stress. Flexure or bending. Beams fixed at the ends and curve of mean fiber. Continuous beams, horizontal shear, combined stresses and eccentric loading. Moving or live loads on a beam. Columns. Rivets and pins. Solid-built beams, I-beams and plate girders. Determination of stresses by analytic methods in simple trusses resting on end supports and carrying uniform dead loads. Effect of moving loads upon trusses with parallel chords. Graphic method of determining the stresses in a truss. The graphic method applied to parallel forces. Dams and retaining-walls. Masonry arches. The pressure and flow of water. Timber. Metals. Natural and artificial stone. Masonry. Foundations. Bridges. Trussed roofs and floors. Highways. Water supply. Sewerage.

This book was designed primarily for the cadets of the United States Military Academy, at which Colonel Fiebiger is professor of engineering. It is of very broad scope, as is indicated by the table of contents stated above, and promises to be a useful text-book.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Brick-Clay Deposits.

Kindly advise me as to authorities on clay deposits as to the value of clay deposits per acre, and as to the worth of the following tests for building brick: Modulus of rupture, 4,022 lb.; crushing load, 17,932 lb.; abrasion, 7.18.

C. H. W.

Answer.—There is a very extensive literature on the clay industry of the United States in the various volumes of "The Mineral Industry," which you may consult with great advantage. The reports of the geological surveys of the various States, in which the clay industry is of importance, also contain a voluminous literature on the subject, especially the reports of the geological surveys of New Jersey, New York and Missouri.

It is extremely difficult for us to give you any correct idea as to the value of clay deposits, since it is so much dependent upon the character of the deposit, its situation with respect to markets and other conditions. We can only say that the value ranges from that of ordinary farming land say, $50 per acre, up into the thousands. Some deposits of clay in New York and New Jersey, of superior quality, have been purchased at as low rate as $80 per acre. A hill of shale, suitable for the manufacture of vitrified brick, in southeastern Kansas, was recently valued at $800 per acre.

The figures that you state indicate that brick made of your clay would rank high. As to the value of your particular deposit, it is not within our province to express an opinion. You should consult professionally some engineer.

Location of Magnetic Ore Bodies.

A magnetic ore finder is locating ore in various parts of the world. In the Barrow district, England, where the hematite iron supply was failing, the instrument indicated new beds, and borings revealed them below the limestone that had previously been thought to bound the ore strata. The Barrow deposits are somewhat similar to our own, and it would appear to me that the magnetic ore finder would be useful for our purposes. I would be greatly obliged if you could give me any information about this instrument and what system is used, etc.—W. F. C. P.

Answer.—The location of iron-ore deposits in this manner has been effected very successfully, especially in Sweden, where magnetic surveying has been highly developed. The instruments employed are a form of dial compass, and dipping needle.

Magnetic surveying is described fully in "Magnetic Observations in Geological Mapping," by Prof. H. L. Smyth, published as monograph No. 36, of the United States Geological Survey (1889); in the recent book by Dr. Eugene Haanel, "The Location of Magnetic Ore Bodies by Magnetometric Measurements," which treats especially of the Swedish methods; in the last edition of Goupillière's "Exploitation des Mines"; and in a paper by V. S. Hillyer, in the Proceedings of the Lake Superior Mining Institute for 1904, entitled "The Practical Use of Magnetic Attractions."

The First Smelter in the United States.

Can you inform me regarding early machine-shop and smelting establishments in the United States, and where was the first smelter erected within the limits of the British colonies? E. L. L.

Answer.—Assuming that you mean by your inquiry the territory which is now the United States, the first smelting by Europeans was doubtless done by the Spaniards in the vicinity of Santa Fé, New Mexico, and in the district south of Tucson, Ariz. The first iron works were at Saugus (then called Lynn, Mass.) where a bed of bog-iron ore was worked previous to 1640, pots, kettles and other small ware being made. Iron manufacture was begun at about the same date at Taunton, Mass.

Lead smelting in crude "log furnaces" was begun by the French in Missouri soon after 1720. It was also practiced at an early date by the English in Virginia, at Wytheville; and Moses Austin, of that place, going to Missouri in 1798, introduced in the latter State important improvements in the art of smelting. During the Revolutionary war, and previous thereto, lead ore was smelted at numerous

points in the British colonies, for the purpose of obtaining the metal for the manufacture of musket balls, pewter and various small wares.

The first machine shop in America (or what is reputed to have been the first) was established in 1794, on the brook known as Second river, near the present town of Belleville, N. J. This was built by Roosevelt, Mark and Schuyler, directors of the New Jersey Copper Mine Association. They built at this point a dam, foundry and the aforementioned machine shop, and erected what are reputed to have been the first copper smelting works. The ruins of a portion of the old furnace are still standing. John Hewitt (an ancestor of Peter Hewitt, the former Mayor of New York city) and a German named Rhode, were employed at these works; the former to make patterns and Rhode to make castings for the engine for Chancellor Robert R. Livingston's steamboat, *The Polacca*, which was 60 ft. long and provided with an engine of 20-in. diameter cylinder and 2-ft. stroke. The boat started on her trial trip on October 21, 1798, and was operated by a jet of water forced out of the stern by a powerful centrifugal pump driven by the aforementioned engine. The smelter was in charge of one Smallwood, and the entire establishment was named "Soho" by Roosevelt, after the large establishment of that name in the old country.

The town of Belleville was formerly known as Second River, the new name being adopted June 26, 1797, Josiah Hornblower being chairman of the meeting. This Hornblower was the engineer who brought to this country the first steam engine in 1753, and the engine was installed only a few miles distant from the shops previously mentioned.

The Hancock Jig.

The Hancock jig, which is manufactured by the Allis-Chalmers Co., is now in regular service at the works of the Arizona Copper Co., Clifton, Ariz., which has five, and seven more in construction; at the works of the Penn-Wyoming Mining Co., Encampment, Wyo., which has one jig, and at the works of the Boston & Montana Co., Great Falls, Mont., which has one jig.

A jig is being constructed for the Newhouse Mines and Tunnel Co., Salt Lake City, Utah, which will be put into service soon. A jig is also being built for the Britannia Copper Co., Ltd., Vancouver, B. C., which will probably be put into service before the end of August. This jig, which is a machine of large capacity, has been introduced into this country from Australia, and its operation is being watched by mill men with careful interest.

The tensile strength of iron is increased, at the temperature of liquid air, from 34 tons per sq. in. to 64 tons.

Compressor Plant at Chicago.

The power plant at the terminal station of the Chicago & Northwestern Railway in Chicago gives an example of modern practice in electrically driven compressor installations. It is located in a small brick building containing two rooms, in one of which are the steam boilers for the heating system of the station; in the other is located the electrical and pneumatic apparatus.

Alternating current is taken from the city mains of the Chicago Edison Company and passed through transformers, reducing it to the working voltage. A portion is used directly on low-voltage alternating circuits, and the remainder is passed through rotaries or motor generators and delivered as direct-current for power purposes.

The air-compressor plant is made up of two Ingersoll-Sergeant compressors, type "J C." They are duplex two-stage machines, with air cylinders, frames and bearings mounted on a cast-iron bed-plate which encloses the horizontal intercooler between the cylinders. Both high- and low-pressure cylinders are fitted with the makers' standard piston-inlet valve, and regulation is secured by a choking controller on the low-pressure intake. This device throttles the air-intake passage, and is controlled by the receiver pressure. It is designed to regulate the volume of air compressed, and consequently the amount of power consumed. The compressors run at constant speed, the controller carrying the effective piston displacement with varying load. The machines have a stroke of 12 inches, with air cylinders 12¼ and 18¼ in. in diameter. At normal speed of 130 r. p. m., each unit has a capacity of 455 cu. ft. per min. The pressure varies from 70 to 80 lb. gauge.

The sub-base is extended to support an 80-h.p. direct-current motor, running at 510 rev. per min., on 220 volts. A pinion on the motor shaft gears directly with teeth on the compressor flywheel; the gears are protected by guards.

An automatic oiling system is provided, fed from a central tank; the drip is recovered and filtered. An intake duct, supplying both compressors, leads under the floor to the open air and rises beside the power house, terminating in a screen cover for the exclusion of dust and cinders.

The discharge from the two units is into an air main leading to the primary receiver outside the plant. From this point the line leads to a system of cooling tubes, made up of a large upper and lower horizontal header, connected by a number of small vertical pipes. This arrangement precipitates whatever entrained moisture may be present, and allows it to be withdrawn. From this cooler air lines radiate to the various locations where required. Secondary air receivers are located at suitable places. The engineers in charge report an excellent performance of this equipment, which has been in severe and continuous service for several years.

Mine and Quarry Accidents in the United Kingdom.

The total number employed in the mines and quarries of the United Kingdom in 1904 aggregated 972,634, and were distributed as follows: Coal mines, 847,553; metal mines, 29,504; quarries, 95,577. In 1903 the corresponding figures were 842,066—29,823 and 94,999. Of the persons employed in 1904 (under the Coal Mines Act), 681,683, or over 80%, worked underground. The number of persons under 16 years employed on the surface and underground was 60,360, or 7.12%, of the workers. At the mines (under the Metalliferous Mines Act) 17,284 persons, or nearly 59%, worked below ground. At the quarries (under the Quarries Act) there were 62,249 workers inside the excavations and 35,328 outside.

At the mines (under the Coal Mines Act), of the 1,055 persons killed, 71 were under 16 years of age. The death rate of the underground and surface workers for 1904 was an improvement over that of 1903 (when it was 1.27 per 1,000 employees). At the mines (under the Metalliferous Mines Act) the death rate for 1903, for underground and surface workers, was 0.84—a better record than for 1904. The death rate of the inside and outside workers at quarries for 1903 was 0.97.

The number of non-fatal accidents reported gives misleading figures, because the system governing the notification of accidents at mines and quarries is vague, and allows much latitude. As regards injuries caused by explosions of fire-damp, explosives and steam-boilers, notifications have to be sent to the inspector, no matter how slight the injuries. The table given herewith gives a convenient summary of the essential facts.

	Fatal.			Non-Fatal
	1904.	Rate per 1,000 employed.	1903.	1904.
COAL MINES.				
Accidents	1,017	....	1,036	3,512
Deaths	1,055	1.24	1,072	....
METALLIFEROUS MINES.				
Accidents	31	....	25	232
Deaths	35	1.19	25	....
QUARRIES.				
Accidents	110	....	90	1,278
Deaths	112	1.15	95	....

A statement of the causes of these accidents, from the advance report of the mine inspector, was published in the JOURNAL of February 2, 1905. The advance figures differed very slightly from those given above.

The moment of inertia of a trapezoid about an axis parallel to its two parallel sides is equal to the moment of inertia of a rectangle whose width is equal to the shorter, plus one-fourth the difference between the two parallel sides.

A Steam and Compressed-Air Meter.

To determine the amount of steam used by industrial works, a test is often necessary; and while it can be done by the installation of complicated and expensive apparatus, the cost of such determination is often prohibitive. If the steam is condensed in water or by a jet condenser, the only way to determine the quantity

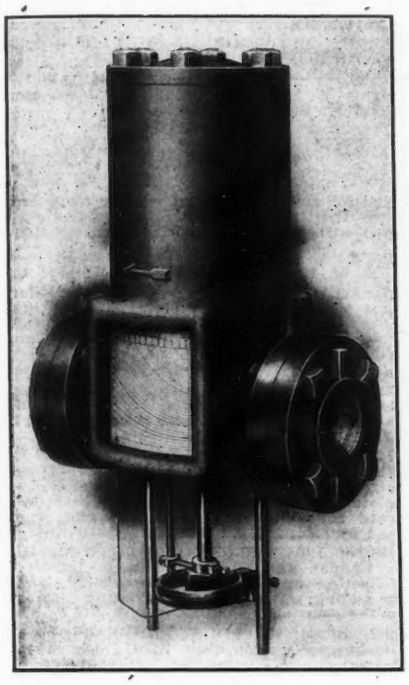


FIG. 1.

is by weighing the water before evaporation, which, on account of using the boiler output for other service, is usually impracticable. The Sargent steam and compressed air-meter is intended to indicate the weight of steam passing through a pipe, with any pressure within the limits of the device; and as this instrument is calibrated by weighing the steam passing through, after condensing this in a surface condenser, the indications in service must coincide with the indications determined in calibrating the meter. The pointer necessarily has a different position for different quantities of steam flowing through, and also a different position for different pressures. If correctly calibrated the readings while in use would also be correct.

Fig. 1 shows the improved form of the Sargent steam and compressed-air meter. It is connected up so as to allow all the steam that is to be measured to pass through it, and this amount is indicated by the position of the needle on the dial.

Fig. 2 is a sectional elevation of the meter, showing the steam passages and moving parts. Steam enters from the left, and rising up around the valve-stem guide passes through the small hole *p;* and, as the pressure increases, raises the valve *i*, allowing the steam to pass down between the two cones and the valve seat to the discharge side of the meter. As the valve stem *k* is open to the atmosphere, the pressure on the discharge side of the meter tends to close the valve and force it to its seat. As the area of the valve stem is about 2% of the valve area, it follows that there will be a corresponding difference in the pressure between the outlet and inlet side of the meter; and that, to maintain the difference, the valve will assume new positions, depending on the quantity of steam flowing through. If the pressure were constant, the rise of the valve would be in proportion to the weight of steam flowing through; but, as the pressure increases, more steam will go through a constant opening; or (as necessarily happens) when the weight remains constant, the opening will be less as the pressure increases. In order to compensate for variation in pressure, a Bourdon spring (Fig. 3) is connected to the bottom of valve stem, which moves the needle transversely as the pressure varies. With a constant weight of steam flowing through, the valve would be open twice as wide for 50-lb. pressure as it would be for 100-lb., from which we see that the horsepower lines go down as the pressure goes up. The meter is calibrated by weighing the condensed steam flowing through under different pressures and

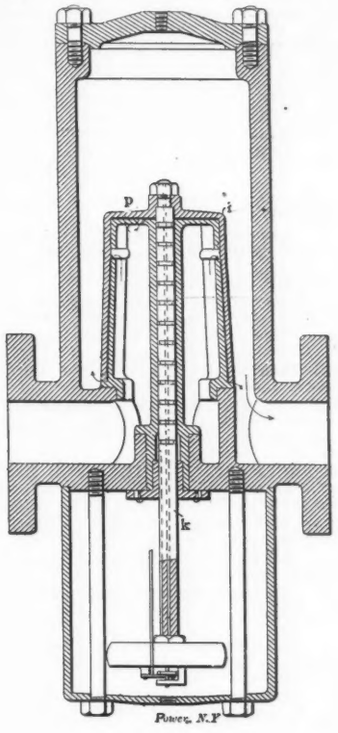


FIG. 2.

valve openings, and the trial dial thus obtained is transferred to the permanent metal dial of the meter. As the meter has but one moving part, it is not liable to get out of order.

The meter is manufactured in sizes from 1 in. to 6 in. by the Sargent Steam Meter Company, 1292 First National Bank building, Chicago.

Shaking Amalgamating Plates.

BY PALMER CARTER.*

An editorial in this JOURNAL of May 11 contained a reference to an experiment tried at the Ferreira mill (Johannesburg, South Africa). It concerned the use of a device for shaking the amalgamating plates below the stamp batteries. The results obtained for the year 1903 may be of interest to some of your readers, and

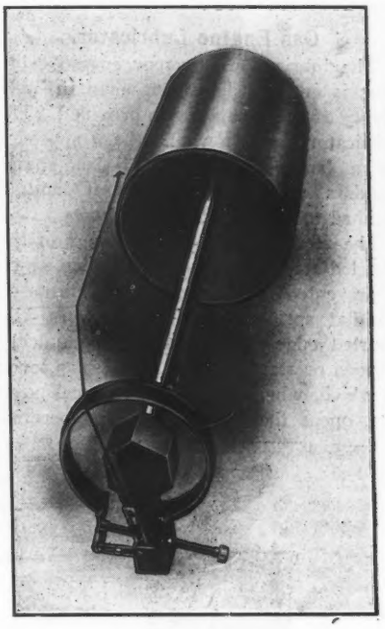


FIG. 3.

I take pleasure in sending the following data.

Average number of plates working during the year			15
Working cost and maintenance:			
White labor	£433	0	0
Colored labor	124	10	0
Stores	120	5	0
Power, 0.75 h. p. per plate	371	5	0
Total expenditure	£1,059	0	0
Revenue:			
Amalgam won	9,576 oz.		
Fine gold from same	2,823 "		
Fine gold @ £4 4 0 per oz	£11,856	12	0
Less costs	1,059	0	0
Profit	£10,797	12	0

The value of the rock milled during the year was 14.028 dwt. per ton. The per cent extraction in the mill, 59.239; of this total, the shaking plates accounted for 1.823%. The 120-stamp mill during 1904 crushed 220,804 tons. Therefore the extra cost per ton milled for recovering the above gold from shaking plates was 1.151 pence; for extra gold recovered in mill of 12.887 pence per ton milled. For the first six months of 1905, 24 of these plates have been running; they gave a total of 1,891.2 oz. of fine gold at a cost of £950, and an increased profit in the mill of £7,560. It is difficult to say how much of this gold would have been recovered in the cyanide works.

Two-thirds of the total gold obtained

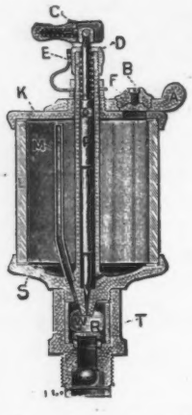
*Manager of Ferreira Gold Mining Co., Ltd.

from the shaking plates is recovered from the black sand caught on the plates. Experiments have been made on this sand with a three weeks' treatment with cyanide solution, from which an extraction of 45% was obtained. In my opinion, every grain of gold possible should be caught in the mill, for on that which passes into the cyanide works, under the present conditions, an all-round extraction of only 75% to 80% is obtained.

Gas Engine Lubricator.

The lubrication of vapor engine cylinders is entirely dependent upon the reliability of the oiling device provided. The lubricator here shown has been approved by a large number of gasolene-engine biulders who have adopted it, and it claimed to answer all requirements.

The feed is regulated by means of the knurled screw *D* on top of the cup, which is prevented from unsetting by means of the flat spring *E*, which engages the knurled edge. The feed can be quickly stopped or started by the small snap lever *C*, which, when placed in a vertical position, opens the needle valve and permits



the oil to flow, but when thrown in a horizontal position closes the valve. This is accomplished without affecting the regulation. It is not necessary to reset the feed after opening the valve. The cup is filled through the hole covered by the slide *A*, which revolves around a central boss *K* on the top. This slide consists of a loose washer beneath the cap containing the screw *B*, by means of which it is possible to adjust the closure.

The cup is also provided with a sight-feed *W*, very large and not likely to become splashed with oil. The glass can easily be removed for cleaning. To provide against the explosions which escape past the piston, interfering with its proper action, the shank of the cup is fitted with a large ball-check valve. It has been found, however, that where the back pressure is unusually great, as in old engines with worn piston rings, the ball check does not entirely remedy the trouble. To meet this condition the lubricator is provided with a baffling cap *R*, placed within the sight-feed glass, just above the check valve. The gases escaping past the ball check are effectually muffled and diffused by means of this cap and the drops form perfectly, drop freely and steadily, and the sight-feed glasses never fill up.

The lubricator is manufactured by the Lunkenheimer Company, Cincinnati, Ohio, which states that the demand for it is large.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ending August 1 1905.

795,825. BLASTING COMPOUND.—Frederick G. Dokkenwadel, Coshocton, Ohio, assignor of one-half to Harry M. Grant, New York, N. Y.

795,835. GAS-PRODUCER.—William B. Hughes, Wissahickon, Pa.

795,839. WATER-TIGHT BUTT-JOINT.—Frank C. Kelsey, Salt Lake City, Utah.

795,842. TUYERE-BUSHING.—Frank Klepetko, New York, N. Y.

795,874. APPARATUS FOR THE MANUFACTURE OF COMBUSTIBLE GAS FROM PEAT.—Charles Whitfield, Northampton, England.

795,887. ELECTROLYTICALLY REFINING SILVER.—Anson G. Betts, Troy, N. Y.

795,886. MAKING ALUMINUM.—Anson G. Betts, Troy, N. Y.

795,907. GAS-PRODUCER.—Henrich Gerdes, Berlin, Germany, assignor to American Suction Gas Producer Company, Lansing, Mich.

795,918. GAS-PRODUCER.—Ernst Korting, Pegli, Italy.

795,923. ORE-FEEDER.—Martin Nelson, Kalgoorlie, Western Australia, Australia.

795,940. PROCESS OF MAKING EXPLOSIVES.—James C. Smith, Lovington, Ill.

795,954. FUSE-IGNITER.—Henry E. Brant, Laramie, Wyo.

796,011. APPARATUS FOR ELECTROSTATIC SEPARATION.—Greenleaf W. Pickard, Amesbury, Mass., assignor to Charles Henry Huff, Brockton, Mass.

796,012. METHOD OF ELECTROSTATIC SEPARATION.—Greenleaf W. Pickard, Boston, Mass., assignor to Charles Henry Huff, Brockton, Mass.

796,013. BORING-MACHINE.—John Purcell, Purchase Line, Pa.

796,021. BLOCK-MOLDING MACHINE.—Ernest W. Smith, Hiawatha, Kan., assignor of one-half to Harvey E. Shumway, St. Louis, Mo.

796,096. SELF-OILING WHEEL FOR MINE-CARS.—John F. Weisbrod, Allegheny, and James D. Rhodes, Sewickley, Pa.

796,103. CHARRING-RETORT.—John E. Aslin, Stockholm, Sweden.

796,110. ORE-CONCENTRATOR.—Ira A. Cammett, Denver, Colo.

796,166. HYDROCARBON-GAS GENERATOR.—Willard I. Twombly, New York, N. Y.

796,170. CONVERTER-LINING.—Charles M. Allen, Lolo, Mont., assignor to Ralph Baggaley, Pittsburg, Pa.

796,172. ORE-DRESSING MACHINE.—Henry S. Anderson and John W. Bennie, Clifton, Ariz.

796,174. COPPER-CONVERTER. — Ralph Baggaley, Pittsburg, Pa., and Charles M. Allen, Lolo, Mont.; said Allen assignor to said Baggaley.

796,175. CONVERTER FOR BESSEMERIZING MATTE.—Ralph Baggaley, Pittsburg, Pa.

796,192. BLAST-LOADING DEVICE.—Egbert Cornelius and Burton G. Cope, Orrville, Ohio.

796,244. CRUSHING-ROLLS.—Richard Pick, Buffalo, N. Y.

796,259. ELECTROMAGNETICALLY-OPERATED RECIPROCATING TOOL.—Harry S. Sherman, Denver, Colo.

796,303. BONE-BLACK KILN.—Bernhardt Eba, Warren, Pa.

796,304. BONE-BLACK KILN.—Bernhardt Eba, Warren, Pa.

796,312. APPARATUS FOR THE REDUCTION OF IRON-SAND, IRON OXID, AND OTHER SUITABLE SUBSTANCES.—David R. S. Galbraith, Aukland, New Zealand, assignor of one-half to William Steuart, Auckland, New Zealand.

796,325. STOPPER FOR ELECTROLYTIC POTS CONTAINING FUSED BATHS.—Charles M. Hall, Niagara Falls, N. Y.

796,327. ATTACHMENT FOR ROCK-DRILL.—Martin Hardsocg, Ottumwa, Iowa.

796,335. GUIDE ATTACHMENT TO ROLLING MILLS.—Alexander M. Johnston, Crafton, Pa.

796,338. PULVERIZING METALS.—Hudson Maxim, New York, N. Y.

796,390. ORE-DRESSING MACHINE.—Henry S. Anderson, Springfield, Mass., and John W. Bennie, Clifton, Ariz.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended July 8, 1905.

11,123 of 1904. TREATING ORES.—J. S. MacArthur, Glasgow. Treating antimonial ores with alkaline solution, thus dissolving out the antimony, which is recovered by means of carbonic acid gas, and the alkali subsequently recovered.

12,816 of 1904. HARDENING STEEL.—S. N. Brayshaw, Manchester. A bath for hardening steel, consisting of chlorides of potassium and sodium, with a small amount of ferro-cyanide of potash.

13,121 of 1904. RECOVERY OF ZINC.—J. Nicholas, Liverpool. Removing zinc from mixed ores by roasting with salt and dissolving out the chloride of zinc, and afterward collecting silver and gold from the lead by means of aluminum.

13,481 of 1904. SLIME DEPOSITION.—H. L. Sulman and H. F. K. Picard, London. Collecting up slimes and depositing them by adding small amounts of soapy matter to the solutions.

17,302 of 1904. DUST-PREVENTION.—Dinsburger Machinenbau A. G., Dinsburg, Germany. Apparatus for controlling the discharge of air after operating rock-drills, in order to pevent the raising of dust.

24,303 of 1904. ROCK-DRILLS.—W. Young, W. Clark, H. Green and C. F. Boucher, Wigan. Improvements in the carriages of percussive rock-drills used in coal mining.

3,194 of 1905. UTILIZATION OF SLAG.—R. Baggaley and C. M. Allen, Pittsburg, U. S. A. In smelting pyrites, using the molten slag from converters to increase the heat in the smelting furnace and to remove the accretions that are apt to form on the walls.

6,585 of 1905. PROCESS OF MANUFACTURING SODIUM PERBORATE.—Deutsche Gold & Silver Scheider Anstalt, Frankfort, Germany. Improvements in method of producing sodium perborate from sodium peroxide and boracic acid.

Week ended July 15, 1905.

13,574 of 1904. ROCK-DRILL.—D. S. S. Steuart, London. Improvements in the driving mechanism of percussive rock-drills.

13,579 of 1904. ANTIMONIAL PLATING.—S. Cowper Coles, London. Coating metallic articles with antimony by immersing them in antimony powder and heating the mass.

17,906 of 1904. BRIQUETTE MANUFACTURE.—L. L. D. Zinderhoek, Amsterdam. Making briquettes from small coke by grinding and agglomerating with cement.

28,611 of 1904. ROCK-DRILL.—J. V. Rice, New York. An improved percussive rock-drill actuated by gas or oil.

2,608 of 1905. SHAFT LINING.—D. Lewis, Glamorgan. Improved form of steel tubbing for lining shafts sunk through water-bearing strata.

3,589 of 1905. ALUMINUM SOLDER.—A. W. King, London. A solder for aluminum, consisting of ordinary solder, to which is mixed equal weights of zinc and aluminum.

3,660 of 1905. MEANS FOR CLEANING SAFETY LAMPS.—E. A. Hailwood and P. Henry Bradford. Improved brushes for cleaning miners' safety lamps.

3,781 of 1905. ROCK-DRILL MOUNTING.—C. Georg and L. Christ, Kaiserslautern, Germany. Improved method of mounting drills in the drill spindles of rock-drills.

6,128 of 1905. MILLING MACHINERY.—G. Johnston, San Francisco. An edge runner mill for crushing ores having a central feed.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. A. O. Coutley, of London, England, is at present in Colorado.

Mr. D. W. Brunton returned to Denver last week from a trip to Alaska.

Mr. William A. Farish reached Denver last week on his way from New York to Arizona.

Mr. H. Carroll Alford, of St. Louis, Mo., was in Denver last week on professional business.

Mr. F. G. Willis, mining engineer of Cripple Creek, Col., is in Idaho on professional business.

Mr. Ernest A. Haggott of the Blue Bell Mining Co., of Mayer, Ariz., was in Colorado a few days ago.

Mr. Leo von Rosenberg passed through Denver a few days ago on his way to southwestern Colorado.

Mr. John S. MacArthur, of Glasgow, Scotland, was in Denver last week on his way to New York.

Mr. L. Humphreys, of the Guggenheim Exploration Co., was in Denver last week on professional business.

Mr. F. Lynwood Garrison, of Philadelphia, started for Santo Domingo last week, on professional business.

Mr. John B. Farish returned to Denver a few days ago from a professional trip to Japan and left for New York.

Mr. Ernest R. Woakes, manager of the Linares lead mines in Spain, will be in London during the month of August.

Mr. John W. Bell, of Lluvia de Oro, Chihuahua, Mex., passed through Denver a few days ago on his way to Canada.

Mr. D. C. Jackling, of Salt Lake, manager of the Utah Copper Co., has been in Colorado Springs on mining business.

Mr. John Stanton, of New York, is in the Lake Superior section inspecting the various mines with which he is identified.

Mr. C. S. Ruttle, for the past four years manager of the Wenona Coal & Mining Co., at Bay City, Mich., has resigned that position.

Mr. John McCleary has been appointed superintendent of the Tallulah Coal Co., at Greenview, Ill., and has entered on his duties.

Mr. John A. Kirby, of Salt Lake, has been appointed manager of the Montana-Tonopah mine at Tonopah, Nev., to succeed Donald B. Gillies.

Mr. Arthur W. Jenks, who has been engaged since March in the examination of mining properties in Nevada and Utah, has returned to Salt Lake City.

Mr. Edward Hooper leaves London early in September for Western Australia, where he will be engaged in examining the Great Boulder Perseverance mine.

Mr. T. A. Rickard passed through Denver on August 2 on his return trip from the Pacific Coast, and after one day's stay left for the East. He is now in New York.

Mr. C. D. Warren, president of the Lake Superior Corporation, returned this week from Sault Ste. Marie, where he had been attending a meeting of the board of directors.

Sir Joseph Lawrence, member of the British House of Commons, who is interested in several large smelting establishments and other industrial enterprises, is in Montreal.

Mr. Charles A. Lamb, of Chicago, recently inspected the property of the Mass Consolidated Mining Co., of which he is president, at Mass City, Ontonagon county, Michigan.

Mr. Robert K. Painter has returned to Dumfries, Va., from a trip to Mexico, where he has been examining some mining properties in the State of Jalisco for Baltimore and Philadelphia capitalists.

Mr. Alexander K. Hamilton, chief engineer of the Lackawanna Steel Co., Buffalo, N. Y., resigned Aug. 1. Mr. Charles J. Barr has been appointed chief engineer and mechanical superintendent to succeed him.

Mr. Arthur L. Pearse, consulting mining engineer, of London and New York, has taken into partnership Mr. C. B. Kingston and Mr. Gerald M. Browne. The name of the firm will be Pearse, Kingston & Browne.

Dr. Austin Flint Rogers, of Columbia University, has been made assistant professor in the department of geology and mining at Stanford University in California. Dr. Rogers will give two courses in petrography and mineralogy.

Mr. Ernest Gayford, of the firm of Morgan Beddoes & Co., of Charlotte, N. C., has disposed of his interests in that firm to Mr. C. C. Morgan. Mr. Gayford's temporary address will be at the Southern Manufacturers' Club, Charlotte, N. C.

Mr. Frank McM. Stanton, agent of the Baltic and Atlantic mining companies, of Houghton county, Mich., has returned to the Lake Superior copper district from New York, where he was confined to a hospital several weeks owing to typhoid fever.

Mr. John Ruhm, Jr., and Mr. John A. English have formed the firm of Ruhm & English, with office at Mt. Pleasant, Tenn., and will carry on the business of mining and dealing in Tennessee phosphate rock. Both gentlemen have had much experience in the phosphate field.

Mr. Charles D. Lawton, recently appointed assistant superintendent of the Quincy copper mine, Hancock, Mich., has taken up his new duties. Mr. Lawton is a son of the former Michigan State commissioner of mineral statistics, Charles D. Lawton, and resigned the superintendency of one of the mines of the Bingham Consolidated Co. in Utah to go to the Quincy.

Professor Wm. P. Blake, who has resigned the chair of geology in the University of Arizona, is still connected with the institution as professor emeritus, and will deliver a course of special lectures to the advanced students on ore-deposits.

Messrs. H. Hayman Claudet and Llewellyn C. Wynne have formed a partnership under the firm name of Claudet & Wynne, as assayers, metallurgists and mining engineers. They have opened an office at Rossland, B. C. Mr. Claudet has managed the Canadian business of the Elmore oil process for several years; Mr. Wynne has been assayer for the Canadian Ore Concentration, Ltd., and for the Le Roi Mining Company.

Mr. Josef Reuleaux, formerly chief engineer to Alex. Laughlin & Co., has opened an office in Pittsburg, under the firm name of Josef Reuleaux & Co. Mr. Reuleaux is the designer of the Laughlin-Reuleaux continuous heating furnace. Associated with him is Herman Buhner, for many years superintendent of erecting for Alex. Laughlin & Co, and W. G. Parker, an engineer from the same concern, who has had charge of the erection of a number of modern steel plants.

Obituary.

Jesse Randel, one of the oldest and best-known coal operators in St. Clair county, Ill., died last week in Belleville, aged 75. He was born in Warwickshire, England, and came to the United States in 1863. He has been engaged in coal mining in southern Illinois for nearly 40 years.

Gustaf H. Stoiber, one of the prominent operators in southwestern Colorado, died of apoplexy while on a train, six miles above Silverton, after having spent several hours at one of his properties in that vicinity. He was forty-six years old, and leaves a widow and one daughter.

W. B. Broadwell, owner of the Broadwell coal mines, at Russellville, Ark., died recently at his home in Kansas City, aged 81 years, and was buried at Springfield, Ill. Since 1897 he has been an invalid as the result of a paralytic stroke, and for the last three years has made his home in Kansas City.

Andrew McFarlane, who died recently in San Bernardino, Cal., aged seventy-six years, was born in Allegheny, Pa., and crossed the plains to California among the earliest pioneers. For many years he was a noted prospector, and discovered several properties which were later developed into mines. Kern county was his favorite ground for a number of years.

Mr. John Wilson, Sr., president of the Western Forge Co., of St. Louis, Mo., died July 16, aged sixty-five years, after a month's illness. Mr. Wilson was born in Glasgow, Scotland, and came to this

country in 1878. He organized the Western Forge Company in 1884, and had been actively connected with the company since its start. Mr. Wilson was of an inventive mind and originated many patents and processes, among them being the well-known Wilson forged steel shoes and dies for stamp-mills.

Rockwell King, a Chicago specialist, who was president of the King & Andrews Co., iron founders, and treasurer of the Harrington & King Perforating Co., Chicago, died at his residence in Chicago, July 28, as a result of blood poisoning which set in from a slight wound on the hand inflicted while pruning shrubbery. Mr. King was born in Chicago in 1853, prepared for college at Phillips Exeter Academy, and was graduated from Harvard in 1874. On leaving college he entered the employ of the Adams & Westlake Co., the president of which firm, J. McGregor Adams, was his stepfather. Some years later he, together with his brother-in-law, John Andrews, founded the firm of King & Andrews, and at that time had a foundry on Union street, Chicago, but moved to Chicago Heights some years later. In 1882 Mr. King bought out the interest of Mr. Oglesby in the firm of Harrington & Oglesby, metal perforators, the name being changed to Harrington & King, and the firm was later incorporated under the name of the Harrington & King Perforating Co., with Mr. King as treasurer. Mr. King leaves a widow, two sons and two daughters.

Societies and Technical Schools.

Agricultural College of Utah.—Circulars Nos. 3 and 4 and Bulletin No. 92 give memoranda of irrigation investigations and arid farm lands as experimental studies. The college is situated at Logan.

Iowa State College.—The first number of the new volume (V.) of the *Iowa Engineer* contains articles on Factory Organization and Management, by R. M. Dryer, and an article on Transformer Designs, by F. A. Fish. The electrical laboratory of the institution, cement fence posts and standard specifications for sidewalks are also the subjects of articles. The *Engineer* is the monthly issued by the Engineering Department at Ames.

Trade Catalogues.

The Western Forge Co., of St. Louis, Mo., sends us its flyer entitled "The Wilson Shoes and Dies for Stamp Millls."

The Davenport Locomotive Works, Davenports, Iowa, sends us its leaflets describing light locomotives for works transportation.

"Kind Words" is a booklet filled with testimonials to the value of the Merrall stamp mill. It is published by the Merralls Machinery Co., of New York city.

"Bulletin No. 19," of the Browning Engineering Co., Cleveland, Ohio, shows types of locomotive cranes built by the company. It is of standard 6 by 9-in. size.

The installation of a storage-battery plant for the Carnegie Steel Co. is described in "Bulletin No. 95," of the Electric Storage Battery Co., of Philadelphia, Pa.

The Michaelson Gold and Platinum Winner is described in the prospectus of the same name, published by the Michaelson Flour-Gold & Platinum Mining Co., of Ogden, Utah.

The monthly bulletin of the Ohio Brass Co., Mansfield, Ohio, appears in the field of advertising literature with the August number. It is 6 by 9 in. in size, and contains articles on single-phase line construction and coal cutters that are timely and interesting.

"Points Worth Knowing," the new booklet of the American Lead Pencil Co., New York, is also worth reading for the hints it gives regarding the use of so modest a tool as the pencil. The illustrations are good, and the descriptive matter well written.

"Record of Recent Construction, No. 50," is the Baldwin Locomotive Works' (Philadelphia, Pa.) latest publication illustrating motor trucks for electric traction. It is of standard 6 by 9-in. size. This company understands the art of presenting material in attractive and convenient form.

The Southern Pacific Railway Co. has published an interesting pamphlet, "The New Nevada," describing the resources and modern conditions of their development in that State. The Truckee-Carson canal, and the great Truckee dam are the subject of excellent illustrations, and will make the publication of interest to the engineer.

Industrial.

The Sullivan Machinery Co., Chicago, has recently shipped to Colon, Canal Zone, Panama, 25 steam rock drills, size UH-11 (3⅝ in.), fitted with the new Sullivan tappet valves, for the Isthmian Canal Commission.

Heyl & Patterson, of Pittsburg, have been awarded the contract for re-modeling battery No. 9 of the Dominion Iron & Steel Co.'s coke-ovens, and for building a new battery of 50 by-product ovens, at Sydney, Cape Breton.

The Pittsburg Coal Washer Co., Pittsburg, has the contract to build a large coal-washing plant for the Sunshine Coal & Coke Co. Another contract for a coal washer has been received from La Belle Coal & Coke Co., Fredericktown.

A sand-lime brick plant, costing $35,000, is now in successful operation at North Judson, Ind., making brick out of sand containing 95% silica. It is in charge of Paul Tafel, of Cleveland, Ohio, and has a capacity of 30,000 bricks a day. F. C. Tracy is president of the company.

The Standard Metalwork Co. has been instituted by the C. R. Bushnell Press Co., Thompsonville, Conn., for the purpose of manufacturing large pipe bends for high-pressure steam service, steam superheaters, condensers, feed-water heaters, refrigerating, evaporating and distilling appliances.

The new foundry building which is to be erected by the Scranton Steam Pump Co., Scranton, Pa., to replace the one recently destroyed by fire, will be of steel and brick construction, 60 by 400 ft. The new building will be equipped with electric cranes, aim molding machines and other modern foundry appliances.

The United Engineering & Foundry Co., Pittsburg, has received a contract from the Passaic Steel Co., Paterson, N. J., for the construction of a 36-in. reversing blooming mill, including tables, two cold saws and two straightaway presses. The mill will be built at the Lloyd Booth plant, Youngstown, Ohio.

The Mineral Ridge Manufacturing Co., Mineral Ridge, Ohio, manufacturer of mine equipment, has not yet completed specifications for the machinery for its new plant. The principal part of the power equipment has been purchased and will consist of a 14 by 36-in extra-heavy duty Scottdale Corliss engine and a 150-h.p. McNaull water-tube boiler.

The American Rolling Mill Co., of Middletown, Ohio, has purchased the six sheet mill plants of the Muskingum Valley Steel Co., of Zanesville, Ohio, thus giving the company an output of about 25,000 tons of sheets annually. The sheet-bar capacity at Middletown is sufficient to take care of this tonnage in sheets, and the company will continue to make its own sheet-bars.

The United States Reclamation Service has awarded the contract for the reclamation of the Yuma Desert to J. G. White & Co., Inc., of New York. It is estimated that the total excavation required will amount to 600,000 cu. yd,, equally divided between rock and lighter material. The dam is expected to require 30,000 cu. yd. of concrete and 50,000 lineal feet of sheet piling.

The work of doubling the capacity of the plant of the Semet-Solvay Co., at Milwaukee, is now well under way, and the company will be operating 40 new coke-ovens by the first of next year. Under the increased facilities of the Milwaukee plant, the company will consume in the neighborhood of 1,000,000 tons of coal annually, and its coke output will come from 80 ovens. When the addition now under construction is completed, the Milwaukee coke plant of the Semet-Solvay Co. will be one of the largest plants of its kind west of the Allegheny mountains.

The Pelton Water Wheel Co., of San Francisco and New York, has just closed a contract for a water-wheel installation for D. J. Aguirre & Co., of Tepic, Mexico.

The head available is 175 ft., and the plant consists of two Pelton wheel units of 700 h.p. capacity each, direct connected to General Electric generators; also two Pelton wheel units for driving exciters. Sturgess oil type governors will be used. Pelton wheels are already employed by Aguirre & Co., there being six wheels at present employed for driving heavy sugar rolls by means of direct connection; also machine shops, electric lighting plant, etc. The export trade in Pelton wheels has largely increased in the past year, this company having made shipments to Central and South America, Japan and the Strait Settlements.

An increased demand for coal crushers by the anthracite companies is reported by the Williams Patent Crusher Co., of Chicago. Recent sales have been made to the Pennsylvania Coal Co., to be installed at the Old Forge colliery, Avoca, Pa.; Lehigh Valley Coal Co., Westmoreland colliery, Wyoming, Pa.; Mineral Spring colliery, Wilkes-Barre, Pa.; Seneca colliery, Pittston Junction, Pa.; Delaware & Hudson Co., Wilkes-Barre, Pa.; Kingston Coal Co., Kingston, Pa. Recent sales of coal crushers have been made to Retort Coke Oven Co., Cleveland, Ohio; Hoover & Mason, Railway Exchange, Chicago; Utah Fuel Co., Sunnyside, Utah; Brown Hoisting Machinery Co., Cleveland, Ohio; Illinois Steel Co., South Chicago; Davis Colliery Co., Coalton, W. Va.; United States Coal & Coke Co., Gary, W. Va. Twenty-four Williams crushers have been installed at the various plants of the United States Steel Corporation, and ten at the various collieries of the Lehigh Valley Coal Company.

Construction News.

Readers of the JOURNAL are requested to inform this Department of pending contracts, or of new work projected, giving name and address of the person in charge of the work or project.

Etzatlan, Jalisco, Mexico.—The Asturiana Mining Co. will install new pumping machinery.

Phoenix, Arizona.—The Mineral Hill Co., in Pinal county, will erect a new 300-ton smelter.

Cottage Grove, Oregon.—The construction of a smelter is being agitated in the Bohemia camp near this place.

Gleason, Arizona.—J. G. Hateley, of the Copper Bell Mining Co., of this place, is arranging for additions to smelter.

Thunder Mountain, Idaho.—A 50-ton mill will be erected on the Navajo group in the Thunder mountain district.

Republic, Washington.—The Oversight Mining & Milling Co. proposes to put in an air compressor, drills and a steam hoist.

Scranton, Pennsylvania.—The plant of the Scranton Steam Pump Co., of this place, recently damaged by fire, will be rebuilt.

Ayutla, Jalisco, Mexico.—The reduction plant of the mines near this place is to be enlarged by the Mexican Union Mining Company.

Hailey, Idaho.—C. C. Ruthrauff, 52 Broadway, New York, intends to construct a new concentrator at the Dollar Hide mines.

Deadwood, South Dakota.—The Columbus Consolidated Mining Co. is to erect a new mill. Wm. Sauntry, of Stillwater, Minn., is president.

Casa Grande, Arizona.—J. Root is to erect a 50-ton cyanide plant at this place. His address is care Italian-American bank, San Francisco, Cal.

Belleville, Michigan.—It is understood that the United States Peat Fuel Co. expects to build a plant here for the manufacture of peat products.

Mexico City, Mexico.—The Livingstone Mining Co. has been incorporated at this place with a capital of $100,000. Pumping machinery will be required.

Chehalis, Washington. — The McCoy Creek Mines Co. will put in its mill in Skamania county, on the McCoy creek. The company's address is Chehalis.

Terlingua, Texas.—Dr. William B. Phillips states that the Dallas Mining Co. contemplates the erection of a 10-ton furnace in the Terlingua quicksilver district.

Maiden, Montana.—It is reported from the town of Maiden that a new cyanide mill will be built on the Rosseau property at the foot of Crystal mountain.

Pendleton, Oregon.—A 30-stamp mill is to be built in the Rye valley district, Eastern Oregon, at the Goldcoin property; address Goldcoin Mining Co., Pendleton, Oregon.

Sonora, Mexico.—Surveys are now being made preparatory to erecting a concentrator for the Sonora Bonanza Mining Co., in Sonora. John Penberthy, of Calumet, Mich., is engineer.

Guadalajara, Mexico.—The Jalisco & Michoacan Railway Co. will soon begin the construction of a railroad from this place to Lake Patzcuaro, in Michoacan. J. N. Zermeno is manager.

Platteville, Wisconsin. — The Sunset Mining Co. will be equipped with a mill and complete machinery. E. B. Smith and J. H. Webb can give information. The company's address is Rewey, Wis.

Goldfields, Nevada.—The Combination mill will be increased, and the Western Reduction Company's mill is to have its capacity doubled. It is also announced that the Dixie mine will build a mill.

Philadelphia, Pennsylvania.—The Philadelphia & Reading Coal & Iron Co. contemplates the erection of a new coal-storage plant at New Bedford, Mass., to take the place of the present antiquated one now in use at that point.

Montgomery, Alabama.—The Mutual Acids Co. will operate and build a plant for manufacturing mine products. It is reported to be an adjunct of the Tennessee Fertilizer Co. R. W. Sparrow, of Columbia, Tenn., is secretary.

Sumpter, Oregon.—The Standard Consolidated Mines Co., H. H. Nicholson, engineer and manager, will erect a 50-ton concentrating plant on its property near this place. Their ores are cobalt-nickel, carrying some gold and copper.

Elk City, Washington.—The owners of the Hogan mines in this place are purchasing additional equipment for their mill; it is also understood that they will add to their milling and crushing capacity to the extent of a 1,000-ton plant at an early date.

Seattle, Washington.—Two companies, in the Mount Baker district, in Putnam county, will install stamp mills during the present season. Red Top and the American Eagle, those referred to, have already contracted for a portion of the machinery required.

Caledonia, New York.—The Monarch Plaster Co. has been incorporated with a capital stock of $125,000, for the purpose of mining gypsum and manufacturing calcined and other forms of plaster. The offices will be at this place. H. B. Nobles, of Rochester, is secretary and treasurer.

Copper Cliff, Ont.—The Canadian Copper Co. will erect a custom smelter at Copper Cliff, Ont., for the treatment of silver-cobalt and other ores which have now to be shipped to the United States for treatment. It will cost $75,000 and is expected to be ready for operation by October 1. The company has a water power at High Falls, and is establishing a plant for the transmission of power to Copper Cliff, 25 miles distant.

Calumet, Mich.—The Ahmeek Mining Co., of Keweenaw county, Mich., post-office address, Calumet, Mich., will erect a rock-house at its mine. The one structure will serve both No. 1 and No. 2 shafts.

The Mass Consolidated Mining Co., post-office address, Mass City, Mich., will erect a rock-house at its new C shaft. A railroad spur is now being extended to the location by the Mineral Range Railroad.

Chihuahua, Mexico.—Governor Enrique Creel, of the State of Chihuahua, Mexico, has made a concession on behalf of the State government to the American Smelting & Refining Co., for the construction of a smelter at the city of Chihuahua. The plant is expected to cost $2,000,000, and to be completed within one year.

Charlottesville, Virginia.—The Southwestern Mining & Chemical Co., of this place, intends to manufacture fertilizers and a mineral graphite paint. A new plant, having a daily capacity of 100 tons of the former and 50 tons of the latter, will be erected. John F. Summers, of Louisa, Va., is secretary and treasurer.

Special Correspondence.

New York. Aug. 9.

The past month, while it was not marked by any mining events of special importance, has a record of steady work and development which is encouraging. The latest goldfields, in point of discovery—the Tonopah, Goldfields and adjoining districts in Nevada—continue their development steadily, and are the scene of a great deal of work, some of which is resulting profitably; while a great deal is wasted on prospects which never come to anything. But this is the rule in all new mining camps. The degree of success attained there has stimulated prospecting in the adjoining regions of California and Nevada. Work in this desert section is no easy matter, especially for inexperienced men; much suffering and some deaths have resulted.

The controversy between the hydraulic and drift miners in California on the one hand, and the farmers on the other, still continues, and the Anti-Débris Association is spasmodically active. The new smelter plants around San Francisco bay have served to bring on another controversy, over the fumes from these establishments and the damage they are charged with working to the farmers.

In addition to existing works, it is understood that the plant of the Selby Smelting & Lead Co., near San Francisco, is to be overhauled, improved and considerably enlarged. Additional smelting capacity on the Pacific Coast is needed, and the new owners of the Selby plant recognize this fact.

Utah mines are active and generally prosperous. The greater share of new work is being done on the copper properties of the Bingham district. New plants are being erected, and some important consolidations are in prospect, notably the transfer of the Utah Copper property.

In Colorado the old camps of Cripple Creek, Leadville and Ouray are doing well. Leadville especially is making a good showing, both from the old mines and from new workings.

Probably the greatest activity at present is in copper mining, which has been stimulated during the present year by the demand for the metal and the high prices. Fifteen-cent copper is a strong inducement to miners and producers of the metal, and the miners are responding freely. In the Lake region the output has been the largest on record. The old mines have been pushed, and a great deal of new work done on their extension, as well as on the opening of new properties. In Arizona the production has been large from the older mines, while the new properties in Bisbee and the adjoining districts are becoming important producers. In Butte the Amalgamated and the Heinze mines are all being worked extensively. A new producer, the Pittsburg & Montana Co., has begun to turn out copper, though somewhat delayed by trouble with its smelting plant, which is of a new type, designed by Ralph Baggaley, on lines resembling a little the Garrettson furnace. In Utah copper development is progressing, as noted above. Everywhere, in short, copper is in demand and copper mining development is active.

A feature in recent mining is the attention paid to discoveries of the rarer minerals—ores of tungsten, uranium, bismuth and the like. Discoveries are constantly reported, and the establishment of plants to treat such ores is projected both in Colorado and California. There is a possibility that such work may be overdone, as the market for these metals is limited, and can be easily over-supplied.

Iron mining is almost as active as copper. The Lake Superior mines—the Old Range producers as well as the Mesabi—are making record shipments, and much prospecting is being done, especially on the western Mesabi. In the old mines of the East there is more work in progress than for a long time. Thus, in New York, the old Chateaugay mines in the Adirondacks are shipping ore; while in the Hudson valley the Fort Montgomery mine has been re-opened, after many years idleness. The Pochuck mine in New Jersey, once a large producer, is to be re-opened, and other New Jersey mines are making a record.

In Canada present interest centers around the Cobalt district in Ontario. Remarkable discoveries of rich cobalt-silver ores have been made. The test of the region as to the value of its ores in depth, is yet to come. Prospecting has also fairly begun in the new region about Lake Abitibi in Quebec, discovered by Mr. Obalski last year.

The coal mining news is of a commercial rather than a technical kind. A movement toward consolidation is evident in the West, especially in Indiana and Illinois, where several large companies have been formed, including important groups of mines. This movement is evidently backed by railroad interests, and its motive appears to be a better regulation of the trade; perhaps, also, the presentation of a stronger front to the miners' union. This merger movement does not seem to be discouraged by the troubles of the Pittsburg Coal Co., the largest consolidation of all, which has been obliged, by declining profits, to suspend payments on its preferred stock.

The threatened labor troubles in Illinois over the shot-firer question, were settled by arbitration. No other labor difficulties of an important kind exist in the western coal regions at the present time.

The anthracite region is more or less disturbed by talk about probable trouble next spring, when the present mining agreement will expire. Most of this is talk only, a sort of skirmishing for position.

San Francisco. Aug. 4.

In Tehama county the Superior Court judge has rendered a decision in favor of the plaintiff in the case of Charles Shively against the Eureka Tellurium Co,, of Shasta county. This corporation has valuable property north of Redding, on the Sacramento river, and the mine is now under bond for a large sum of money to a syndicate which proposes to develop the property. Judgment was given in favor of the plaintiff for nearly $15,000, money advanced and services rendered to the company.

There will be less danger in the deserts of Kern, Inyo., Los Angeles, San Diego and other counties in the future than there has been in the past. The Los Angeles Chamber of Commerce has agreed to furnish maps, and the work of erecting sign-posts for the guidance of mining prospectors and others who travel on the desert has begun. Wells will be improved and water holes will be enlarged. An act was passed by the last legislature of the State for the appropriation of $5,000 for the purpose of procuring metallic guide posts to be erected in the desert sections of California, and particularly in the counties of Kern, Ventura, Los Angeles, Inyo, Riverside, San Bernardino and San Diego, upon which are to be indicated the distance and direction of wells, springs and tanks of water fit for drinking purposes. Other information of value will be contained on the posts. The work was left to the boards of supervisors of the counties named, but they have hitherto been apathetic and have done nothing.

At Porterville, Tulare county, where extensive deposits of magnesite are being worked under the supervision of W. P. Bartlett, calcining furnaces have been erected and have been fired up. There are some 15,000 tons ready for calcining. It is unfortunate that freight rates eastward are too high to permit of shipments of this mineral to Pittsburg. There is plenty of magnesite in California, but the local market will only take 4,000 to 5,000 tons yearly.

The excitement over the tungsten discoveries in the region about Randsburg, Kern county, is rather on the increase, as more and more claims are located. On the Papoose claim, which is owned by Thomas McCarthy, Henry Giandonni and others, the ledge is from 18 to 20 in. in width, and the ore is claimed to assay from 70 to 78%. Another strike was made last week on an adjoining claim by Curran & Mirch, and there the ore is equally good. The owners of the Papoose claim uncovered a second vein. McCarthy and his partners are now taking out a car-load of the richest of their ore for shipment to Wilmington, Del. It is the intention of the principal tungsten claim-

owners to put up a plant on the railroad near St. Elmo and concentrate the ore there. The tungsten field, as it is at present known, is two by three miles in extent, and is now believed to be the largest producing territory of that valuable mineral in the United States, the ore having likewise the largest percentage of tungsten.

From present indications, the Big Blue mine at Kernville and the Lady Belle group will again be worked. The attorney for the Lady Belle Co. is preparing a petition to the board of supervisors for permission to construct a transmission line from the Kern River Co.'s power house to the Big Blue mill. The Big Blue mine is one of the oldest properties in Kern county, and in the early days produced many thousands of dollars for its owners. Many times, since the mine was closed down several years ago, there has been talk of working it again, and it is known that there are still large bodies of pay ore.

Denver. Aug. 4.

A petition has been filed in the District Court for an alternative writ of mandamus on the part of James F. Burns, against the Colorado Springs & Cripple Creek District Railway, compelling the directors to allow him to examine the books. Mr. Burns charges them with secret manipulation of the stock and his action is directed against those in control of the Colorado & Southern Railway system as well.

The suit of John A. Thompson against Thomas F. Walsh for a half interest in the Campbird at Ouray, involving several million dollars, was decided by Judge Platt in the United States Circuit Court of New York in the defendant's favor.

In San Miguel county a large quantity of vanadium ores have been found lately and practical tests of these will be made by a New York company, formed for the purpose, which expects to build a milling plant a few miles below Telluride.

The matter of the extension of the Denver & Intermountain Railway from Golden to Idaho Springs seems to be an assured fact, and rights of way are being secured.

The total receipts at the branch mint during the past month were $2,127,507, somewhat lower than during June. The expectation was to commence coinage on August 1, but on account of necessary changes in the construction of the building, it will probably be October 1 before active operations will commence.

Within a few days the Denver, Northwestern & Pacific trains will run into Hot Sulphur Springs, the present terminus being Tabernash, a distance of 12 miles from the former point, while tracklaying is progressing as fast as possible. There has been a great deal of delay on account of the non-arrival of steel bridge-material from the East. Surveys from the lower end of Gore cañon, the right of way through which is in controversy, to Steamboat Springs, a distance of 50 miles, have been completed.

Ground for the construction of the administration building for the State School of Mines at Golden, for which Simon Guggenheim donated $75,000, was broken this week, and it is expected to complete the same about July 1 of next year.

The chairman of the Joplin, Mo., district committee, John R. Holmes, who is raising a fund of $10,000 to defend the interests of his people in event an appeal is taken in the case against the importation of foreign zinc-bearing ores, has published a letter from Secretary Shaw which says that the question of duty on zinc sulphides will be submitted to the decision of the courts as early as possible.

Scranton. Aug. 5.

The Reliance Coal Co., of which W. L. Schlager, of Scranton, is president, and in which many gentlemen of this city are interested, is progressing at a rapid rate with work at Pittston under the direction of Superintendent Hogan. In addition to its new workings, near the Atlantic Refining Co.'s plant at Pittston, the company has commenced work on its new shaft, which will sink a distance of 200 ft. to the fourth vein. The rock taken from here will be run into the old workings to support the earth from settling after the pillars are removed. A second opening will be sunk later. Through this new opening the company will have access to 100 acres in the fourth vein, as good as any in the valley. Great precautions are being taken that the property will not be endangered by blasting.

Nearly all of the large companies in the anthracite coal fields will suspend work this week, to last a week or more. Mr. Davis, general superintendent of the Lehigh Valley Coal Co., Hazelton division, says that it is a suspension of time which takes place annually for the purpose of repairs and general overhauling, preparatory to the fall and winter shipments. He had no idea what the individual operators would do, but stated the company he represented would have a complete shutdown for the time mentioned. This suspension was planned some time ago, but the companies came to the conclusion that next week would be the proper time, as President Roosevelt was about to visit the anthracite region, and broken time would be the inevitable result.

A deed was placed on record at the office of the recorder in Pottsville on August 2, conveying about a dozen parcels of land from the Hazelton Coal Co., a parent corporation. The tracts are rather extensive and the consideration nominal. The land is located in Pottsville, Yorkville and Kline townships, Schuylkill county; in Hazle township, Luzerne county; in Banks township, Carbon county; and in several other districts in the adjoining counties. The land is principally coal land, and the conveyance may mean extensive developments in the line of new or resumed operations in this locality.

From present indications, this will be the worst year for accidents in the history of the anthracite coalfield. For instance, in the third district alone there have been 27 fatal accidents already this year, only four less than the entire number for last year. The figures of the twelfth district show a similar state of affairs.

The following important regulations by the Lehigh Valley Railroad Co., governing the shipment of explosives, came into effect on August 1: Explosives will be received for transmission over the Lehigh Valley Railroad only under such regulations as are laid down by the superintendent of transportation. Shipments of explosives beyond the Lehigh Valley line will be accepted only subject to the regulations of the roads over which the shipments are to be moved. The safe transportation of explosives is believed to be largely influenced by the manner in which the explosives are packed for shipment. For transportation purposes all explosives are to be divided into the following groups: Common black powder, high explosives, smokeless powder, carbide of calcium, fulminates, ammunition and fireworks. All common black powder must be packed in packages containing less than 20 lb. each. These packages must be inclosed in a wooden box in such a way that the filling hole is up and the boxes, when filled, must not weigh over 100 lb. No high explosives will be received for shipment in the liquid form in bulk. Each kind of explosive has a different rule as to how it is to be packed. Common black powder, high explosives, smokeless powder, picric acid and fulminates in car-load lots will be received on any day except Saturday, and in less than car-load lots on Monday and Thursday of each week. Only steel underframe box cars, equipped with air brakes in condition for service, and which have been specially selected and inspected, will be used in the transportation of explosives in lots of 5,000 lb, or over, and they must be in first-class condition inside and out. A car containing explosives must be hauled as near the middle of the train as possible, and must not be placed next to a car loaded with oil or other inflammable material, nor between cars loaded with iron or steel, granite, marble, timber logs or any other material of like nature liable to perforate a car of explosives in event of collision.

The Pennsylvania Coal Co. is about to start operations in sinking another new slope to the Hillman vein, on the east side of No. 14 breaker, near Pittston. This vein of coal is of excellent quality, is only a short distance from the surface, and has never been worked to any great ex-

tent in this section. In the early years of mining the farmers used to mine some coal near the surface, and they secured it without any great difficulty. With both of these slopes in operation, and another opening started in Plainsville, it is expected that a large output will result.

Calumet. Aug. 5.

This week marked the entrance of the Allouez mine into the producing class. Shipments of rock are being forwarded to the Centennial mill at Grosse Pointe for treatment. The Allouez begins its career as a producer under auspicious conditions. The Centennial, which is under the same management, has entered into a satisfactory contract to handle its rock, and shipments are being made over the Mineral Range railroad. Development work at the mine in Keweenaw county has progressed sufficiently to permit shipments of 250 tons of rock daily. It is the expectation of the management that one head will be operated alternately, a week at a time, on rock from the Centennial and Allouez mines. In this manner the production of each property can be handled with greater economy.

Openings at the Allouez show a highly mineralized lode from the first to the fourth levels, inclusive. The shaft, No. 1, is sinking to the fifth level and within a short time it will be possible to start drifts at that depth. There is a stock pile of about 5,000 tons of rich rock at No. 1 shaft and this will be shipped to the mill for treatment. While too much stress should not be laid upon the result of the first few weeks' mill test, it is confidently expected that the Kearsarge lode will average 30 lb. of fine copper per ton of rock stamped from the Allouez mine. The character of the underground openings warrants this opinion and possibly the rock will prove even richer.

Rock shipments from the Atlantic mine have been increased to 1,000 tons per diem, the mine being on a profitable basis once more. Owing to the radical changes under way in the system of underground operations, production has been curtailed and earnings decreased. When the new system has been substituted fully in every department of the mine, the operating costs will be much less than at present, and the Atlantic will be enabled to make its copper for considerable less money.

President John Stanton, of the Atlantic Mining Co., arrived from New York this week. It is expected that he will conclude the deal pending between the Baltic and Atlantic mining companies for the exchange of land on the Baltic amygdaloid bed. The Atlantic will gain sufficient territory carrying the outcrop to permit two shafts being sunk, and work will be started before the end of the current year.

Further improvement is noted in the lowest levels of the Centennial's No. 1 shaft. While it is too early to state positively, it appears that the north drifts are entering the rich shoot of copper ground making southward from the Wolverine mine. No. 1 shaft is still sinking and 25 drills are in commission. Openings are being enlarged steadily, and within a year the available stoping territory will be greatly increased. The work of cutting No. 2 shaft down to the size of a two-compartment shaft is advancing rapidly.

The grade of rock which is being forwarded to the stamp mill reflects the betterment in the lower workings.

A 150-lb. mass of copper was taken out of the amygdaloid bed encountered in the crosscut on the 180-ft. level of the Superior Copper Co.'s shaft on section 15.

Rock shipments from the Calumet & Hecla company's two active shafts on the Osceola amygdaloid formation are of an excellent grade, the average mill returns being better than 1% fine copper. In view of the favorable showing, it is probable that one or more of the idle shafts on this branch of the mine will be re-opened before the end of the year. At present work is confined to No. 13 and No. 16 shafts. The former is the most southerly opening on the Osceola lode in Calumet & Hecla territory. Nos. 14 and 15 shafts intervene between it and No. 16. A few hundred feet northward of No. 16 is No. 17. All the Osceola lode shafts have permanent plants with the exception of No. 17, and in the event of further expansion on the Osceola branch by the Calumet & Hecla, No. 14 or No. 15 shafts would be reopened.

Salt Lake City. Aug. 5.

It is expected ground will be broken for the new 2,000-ton copper smelter of the American Smelting & Refining Co. to be built in the Salt Lake valley during the coming week. This announcement has been made officially.

According to recently compiled statistics, the mines of the copper camp of Bingham are furnishing employment for about 2,500 men, and other industries in the camp for about 500 more, making a total of 3,000 that depend upon the mines for a livelihood. The monthly pay roll exceeds $200,000. The output of the camp daily aggregates about 3,000 tons. of ore. The foregoing figures are based on the following:

	Men.	Tons.	Pay-roll.
Highland Boy	350	850	$2,000
Yampa (mine and smelter)	425	425	25,000
Utah Copper (mine and mill)	400	700	20,000
United States	300	425	12,500
Bingham Con	300	500	20,000
Boston Con	120	250	7,000
Bingham-New Haven	50	50	5,009
Ohio Copper (mine and mill)	95	225	6,000
Utah-Apex and Red Wing	60	45	4,500
Fortuna	45	50	3,500
Phoenix	60	100	7,500
Silver Shield	22	...	2,100
New England	20	25	1,500
Butler-Liberal	20	...	1,500
Other properties	150	25	10,000
Total	2,417	3,670	$158,100
Other industries and occupations	500		45,000
Grand total	2,917		$203,100

The Martha Washington mine in Tintic was sold during the week under an execution for $1,800.

There is no doubt in Salt Lake mining circles that the control of the Utah Copper Co. will pass to the American Smelters' Securities Co. soon. The stock is to be sold by the Colorado Springs syndicate, which is in control of the United States Reduction & Refining Co., and will include practically all their holdings.

The Dexter mine at Tuscarora, Nevada, has been bonded to an Eastern syndicate and the first payment made.

The Utah Apex mine, of Bingham, is the scene of an energetic campaign. The company is not only driving a long tunnel that will tap the lower workings at great depth, but it is also doing extensive exploratory work on the upper levels.

The Majestic Copper Mining & Smelting Co., operating in Beaver county, is now devoting all its attention to the development of the Old Hickory copper mine and the Harrington & Hickory lead mine. Except for the lessees, nothing is being done in the O. K. copper mine, which contains a large tonnage of low-grade copper which will need concentration before smelting.

The mine owners of Alta are making vigorous efforts to induce the Rio Grande Western Railroad company to repair and place in operation the branch line from Sandy to Wasatch, which would cut down a long wagon haul and lessen the costs of transportation. The mine owners are experiencing a great deal of difficulty in getting ores to market owing to a scarcity of teams.

Leadville. Aug. 3.

Uranium has been found in the Twin Lakes district in the Walesburg Garwood No. 3 and Newark claims in Williams gulch, towards the head of Twin mountain peak. William Holz and Mark E. McCourt, of Chicago, are the locators. F. I. Foote, of Chicago, has taken an option on the claims and will drive a tunnel into the mountain 500 feet.

O. D. Mansfield, operating on Grand river, in the Red Gorge district, has located 121 claims and is using a diamond drill to prospect the territory. The drill has been put down in several places 160 ft., going through 7 ft. of mineral that carries gold and silver. The ore is in blanket form and was found in the quartzite. On the south side of the river he is working a fissure vein in the granite, the shaft being down 35 ft., with the 7 ft. wide, carrying good values in gold and silver. The district is six miles above the State bridge. Mansfield is backed by Pittsburg capital.

The present plan of the Resurrection people is to pull the pumps from the lower workings, and devote their energy to the oxide zone in the upper levels. Should this plan be carried out, it will be

the cause of closing several properties in the neighborhood of the Resurrection, as none of them are in a position to handle the water from the lower levels.

The Penn, Ballard, Big Six and President, on Breece hill, all carry bismuth, but the market for the product has been so unsatisfactory for the last few months that but little of the ore has been shipped. John Clay, representing the Merck Chemical Co., of New York, was in the camp during the week, making arrangements to purchase the product from the mines. He stated that his company would erect a mill in Denver to treat all of the rarer minerals found in the State.

There is a demand for zinc, and as Leadville is the heaviest producer in the State, Pittsburg people have become interested in the camp and will erect a mill, near the Norton Sampling Works, for the treatment of the lower grades of zinc ores; it is claimed that zinc ore carrying only 15% will be handled successfully. H. H. Norton will be in charge of the mill.

The Garibaldi tunnel, at the head of California gulch, has been driven 1,500 ft. and recently a large body of pyritic iron, carrying a little over 50% sulphur, was opened. The lessees, Bray & Davis, are making arrangements with an Illinois outfit to take the ore for the sulphur that it contains.

In addition to the extensive work being carried on by the Iron Silver Mining Co., at the Moyer, Tucson and Dome, a number of lessees are pegging away at the old Iron mine, and Patrick Kelly on the Bull's Eye is shipping 40 tons daily of high-grade iron; from the King-Ostrum lease a good tonnage is also being shipped. Near the old incline other leasers are shipping steadily, and work is being carried on in virgin ground to locate the ore-shoot that was lost in the incline years ago.

The Fidelity Mining & Milling Co., Twin Lakes, will start at once to work the group of claims owned by the company on Bull hill. Float running high in gold has been found, and a tunnel will be driven to cut the veins at considerable depth. The company is incorporated and capitalized for $1,000,000; the incorporators are Charles E. Fox, of Philadelphia, and Thomas Henneberry, of Denver. In one tunnel belonging to the company, a large body of low-grade sulphide has been opened, running from $4 to $10 per ton in gold.

The output for the month of July comes close to 74,000 tons of all classes of ore; zinc reaching nearly 10,000 tons.

The Crystal Gold Mining Co., operating at Half Moon, will put in a concentrating mill to treat the large bodies of low-grade ore found in the different claims. Two shafts have been sunk 150 and 300 ft., and five tunnels have been driven in on different veins from 300 to 500 feet

Butte. Aug. 1.

Amalgamated is making rapid progress toward the opening of its veins at greater depth, and is maintaining its output of ore from points previously opened. The daily extraction is 10,000 tons. Much of the output averages only 1.5% copper and a small amount of silver, but the concentrating facilities enable it to be treated at a profit. Mines owned by the Boston & Montana are yielding a better class of ore. The Anaconda and Neversweat, owned by the Anaconda Co., are also yielding good ore, making the bulk of the production average well.

North Butte is keeping up its output of between 700 and 800 tons per day and is preparing for the new hoisting engine ordered a few weeks ago. The contract calls for the delivery of the machinery December 1. Mining operations are being confined principally to the Jessie; the vein is holding its own in strength and quality. No attempt to sink deeper will be made until the new engine is installed.

United Copper is gradually increasing its output of copper. It is receiving between 700 and 1,000 tons of ore per month from the Lexington property, but the product is shipped in the name of Louis Girard, owner of the mines, who lives in Paris. Its Minnie Healey mine is out of commission temporarily, on account of the condition of the shaft below the 900-ft. level. A squeeze occurred near that level last week and an ascending cage stuck. The damage will be repaired in a few days.

The Raven Co. has cut another vein of copper ore at a depth of 1,200 ft. and is crosscutting for another farther north. The last vein is 5 ft. wide and carries 5% copper and 10 oz. of silver.

The Reins Copper has installed a second pump on the 800-ft. station, and is awaiting the arrival of a new hoisting engine, now due from Ottumwa, Ia. The new pump will throw 700 gal. of water 800 ft. per min. An upraise has been made from the 800 to 600-ft. level, and will be continued to the surface. Sinking will be resumed the latter part of the week and continued until a depth of 1,200 ft. is attained.

Colorado, now the Trenton, a sub-company of Amalgamated, is subjecting its tailings to the precipitating process, and the Parrot has received an offer of $75,000 from D. J. Hennessy for its tailing dump, comprising several hundred thousand tons.

After a shut-down of several days on account of an accident to the blower, the Pittsburg & Montana Copper Co. will start its smelter again tomorrow. With the exception of one compartment, its large bins are full of ore. Drifting west on the veins at a depth of 1,200 ft. is progressing. The mine work is now well advanced and, barring accidents, the smelter can be kept in continuous operation.

Cripple Creek. Aug. 5.

The Cripple Creek district is making a very creditable showing at present in a mining way. A number of the mines, however, are reducing their forces a little, some only temporarily and some otherwise. A very strong effort is being made to get rid of the ore thieves, or "high-graders," in the district. Quite a number of the mines are being worked on the leasing or tribute system. Among these are Stratton's Independence, the Ajax, Gold Coin, Last Dollar, Hull City Placer and others. In these mines the leases are let in blocks in the mine, and the hoisting is done by the company and charged to the lessees. A number of other properties are also being worked by lessees, many of whom are operating their own plants and have workings separate from each other. Quite a large part of the holdings of the Stratton estate have been leased and considerable work is being done on this property. Lately some of the leases have closed down, some for temporary reasons and some because they did not pay.

Beacon hill is at present quite lively, especially on the western side. On this side are working El Paso, the C. K. & N., Old Gold, Henry Adney, Lonaconing, Maid of Orleans, Mary Nevin and others. The expectation that the new drainage tunnel will soon be commenced, as well as a number of new strikes in this vicinity, has given quite an impetus to work. No great amount of new machinery is being put in, although several compressors are being installed

The Homestake mill, which is the largest cyanide plant in the district, is closed down, presumably on account of the low values of the ore. Several smaller mills are running. The Portland mine keeps up its usual steady production, as well as the Vindicator and other large mines. The old Isabella is being worked under lease and is shipping some ore. The Empire State property of the Isabella Mines Co. is being worked on company account. The W. P. H., on Ironclad hill, is being worked by the owners, while a number of other properties in the vicinity are being operated by lessees. As far as can be seen at present, the merging of the railroad interests in the district has not hurt mining operation in any material way.

Paradise, Ariz. July 31.

At the Chiricahua Development Co. work is progressing as usual. While waiting for the new boiler, work has been discontinued at the Mars shaft and the force of men brought over to the Planet shaft, where they are now preparing to continue sinking and where they will start two drifts. Rumors are current that there is high-grade ore in the crosscut, at the 385 ft. level. This rumor is not confirmed from headquarters, but meantime their

stock has dropped from $14 to $12 per share.

At the Manhattan Development Co. work continues satisfactorily. The contractors have gone about 60 ft. in the tunnel work and cut a 15-ft. blind ledge that does not show on the surface. It contains some good-looking copper ore. They are still in ore in the winze and are cutting a station for the windlass. This work is being done on the east end of the group. On the west end a winze has been started in the tunnel. The two workings are divided by a mountain about 800 ft. high, and the ledge cuts the mountain at right angles. On the surface of the ground the ore outcrops nearly the entire distance.

At the Savage Gold & Copper Co., work continues as usual. The long tunnel is now in 3 ft. of ore that carries about 5% copper, 40 oz. in silver and $2 in gold. This tunnel is in about 300 ft. The company is making an upraise to surface about 150 ft. from the breast of the tunnel and sinking a winze about 50 ft. from the breast, cutting a station on the south side of the tunnel for the windlass. At the main shaft the connection for air is completed. This is down 100 ft., all in ore, the shaft being on the footwall, which to this depth is about vertical. In sinking the 50-ft. shaft, which is about 40 ft. from the main shaft, they encountered the ore 30 ft. down. In making the crosscut to connect with the main shaft, they cut through 23 ft. of ore that goes 6% copper, 45 oz. in silver and $2 in gold. Their mine is looking remarkably good.

At the Early Bird group, the preliminary survey has been finished. At two of the surface openings they have some ore that will run about 100 oz. in silver, 12% copper and $2.50 in gold. I am informed by the owner that he expects to start development work in the near future.

At the Cochise Consolidated Copper Co., work is being pushed to supply air. This property is liable to surprise the district if the present management continues to operate it.

At the Copper Range group, which is under bond to S. S. Badger, who represents Eastern parties, the owners have begun work on the western end of the ground, and will soon be shipping some high-grade ore. It is expected that the sale of this property will take place the coming month.

All of our prospectors are hard at work doing their annual assessment work.

One of our peculiar mineral deposits is what is known as the cave. This cave is one of the wonders of the world. It is formed by ancient water courses crystallizing the lime, forming thousands of the most beautiful stalacites and stalagmites and countless thousands of various flowered formations that are wonderful in their shapes and colors. The cave is formed of many chambers of various sizes, connected by intricate passages. The formation has a dip into the hill of about 45°, and the writer has been down about 700 ft. and did not begin to reach the bottom.

At the town of Paradise business is good, but quiet, with no new news items since my last article.

Platteville, Wis. July 31.

The Platteville zinc and lead district has been developed almost entirely by local capital, the method pursued being as follows: First some 20 or 30 form a pool for prospect drilling, and when ore is discovered they generally organize a company. Those who care to put up their share for machinery, etc., can, and those who do not care to do so can easily sell out to the other members of the pool, at a sum in advance of the original investment. Nine-tenths of the prospects in this locality are being developed in this manner. There are now in the immediate vicinity of Platteville, Wis., some 30 to 35 drills in operation. Strikes are being made constantly. The people do not rush ahead putting up plants and expensive machinery, but thoroughly prospect their property before going to additional expense.

A deal for the Sunset Mining Co.'s stock was closed this week. The mine is located near the village of Rewey, Wis., in Iowa county. Their lease consists of 120 acres, between the Sunrise and the Coker mines, the latter operated by the New Jersey Zinc Co. The original owners of the mine and a local firm of brokers are the parties interested. The consideration is $75,000 cash, less commissions.

The mine is reported to be rich in high-grade zinc and lead ore. It has been thoroughly prospected along the range and drilled in several places. Slabs of solid ore 5 to 8 in. thick and weighing from 1,000 to 1,500 lb. have been taken out. It is the intention to erect a modern concentrating plant at once. The organization of the company will take place this week, at which time arrangements will be made to install the needed machinery.

One of the best-equipped mines in the Platteville district is that of the Empire Mining Co., within the corporate limits of the city of Platteville. This mine was originally started by several local people who still hold control. Their equipment consists of a 125-ton concentrating mill. The Empire mine is one of the richest in the district, and incidentally the best payer of dividends. It has recently installed a complete electrical generating and power plant, with which a portion of the concentrating plant is operated; also the ventilating fans and light plant. This property has been operated for two years and has more than returned to the owners the original money invested. To avoid speculation in stock the holders have agreed not to sell their shares until they have offered them to the board of directors. A few shares have recently changed hands at $450 per share, the original cost being $60. There is enough ore in sight, on a conservative estimate, for at least three years' operation, without any more being opened up. Differing from the general run of mines in this district, there is not enough low-grade ore at present to necessitate a magnetic separating and roasting plant. The Empire mine, however, has quantities of low-grade ore which are not touched at present, but stored away for future operation.

Sudbury. July 28.

Argument was heard before the Hon. Frank Cochrane, Minister of Lands and Mines at Toronto this week regarding a dispute of ownership of a nickel-mining location in the township of Morgan. The Edison Electric Nickel Mining Co. made considerable improvements on the location, but failed to comply with all the conditions of the Mining Act of the Province. A. H. Beath, of Sudbury, was a subsequent applicant, and now claims the location. Samuel Blake and J. M. Clark are the leading counsel in the case, the former representing the Edison Co. and the latter the interests of A. H. Beath. Judgment was reserved by the minister, so that he might confer with his predecessor in office as to a ruling already given by him. The property is an important one and much local interest is centered in the outcome.

A number of prospectors who left here for the famous Cobalt region have returned, though as many more remain to prosecute further research in the district. The universal opinion is that it is certainly a rich field; this remark comes from many who have been themselves unsuccessful in securing anything visible or even valuable.

Toronto. July 29.

The work being carried on by the Dominion Geological Survey this season is the most extensive since its establishment. No less than 35 parties are in the field, about two-thirds of them west of the Rocky Mountains. A few parties are working in the East, the field of their operations including the Ottawa valley, Northern Quebec and Nova Scotia. A survey of the shores of Hudson bay is being completed.

Recent discoveries have extended the iron-ore area of the Loon Lake region, east of Port Arthur. Wiley Bros. report new finds on their location of good quality and sufficiently low in sulphur and phosphorus to be suitable for bessemer steel.

The Loughborough Mining Co., Ltd., head office Sydenham, capital $10,000, has been incorporated, with Myron F. Westover, Edward Clark, Daniel M. Barton, Allan H. Jackson and G. W. McNaughton as provisional directors.

The mineral display of the Canadian Government in the Imperial Institute, London, kept there as a permanent ad-

vertisement for the country, is to be overhauled and enlarged, as some of the more recently discovered Canadian minerals are not represented.

At a meeting of about a hundred residents of Cobalt, held on July 20, a resolution was adopted requesting the Provincial Government to have the town site surveyed at once. The Timiskaming & Northern Ontario railway commissioners, who are constructing and operating the line as a government road, have been given control of the town sites along the railway, with power over the minerals. The roadbed, especially around Cobalt, is rich in mineral deposits, the disposal of which will be regulated by the commission.

The Provincial Government of Ontario has cancelled three leases of mining properties in Trill township, Algoma district, held by the Great Lakes Copper Co., for non-payment of rents since 1901.

The United Gas & Oil Co., of Windsor, which suspended operations in the Wheatley oilfield some time since, but recently resumed, struck a flowing well about 2½ miles from Wheatley, this week.

Victoria, B. C. Aug. 2.

Vancouver Island.—The report of the Tyee Copper Co., Ltd., owning and operating the Tyee mine and several neighboring claims on Mt. Sicker, Vancouver Island, for the financial year ended April 30 last, which was submitted to the annual meeting of shareholders, held in London, England, on July 13, stated that the development work carried on at the mine during the year had not resulted in the discovery of any new orebodies. Later information from the company's general manager, Mr. Clermont Livingston, was to the effect that the formation then being worked in was of a similar nature to that in which occurred the large orebody now being mined, and which, by the time it shall be exhausted, will have yielded from 200,000 to 300,000 tons of commercial ore. Prospecting is being vigorously carried on, the indications encouraging the belief that new orebodies will yet be found. An interim dividend of 10% was paid last December, but the directors do not propose to divide any more of the accumulated profits until after such time as new ore-shoots shall have been discovered and their extent and value proved.

Atlin.—A press despatch from Atlin gives the following summary of operations in that northern British Columbian goldfield: The Guggenheim Exploration Co. has large parties prospecting O'Donnell river, near Atlin, with good results. The British-American Co.'s dredge, operating on Gold Run, is working in rich ground, and the company has constructed a new dam for water supply to the power-house. The first steam-shovel plant to reach Atlin will be ready for work on the property of the Northern Mines, Ltd., on Spruce creek, early in August. The Spruce creek dredge, owned by the B. C. Dredging Co., which is backed by Boston capitalists, will be in operation about August 15. The capacity of this dredge is stated at 3,000 yards per day. The Atlin Mining Co.'s first clean-up on McKee creek this season totalled 470 oz. The Pine Creek Power Co. is working rich ground and a comparatively large recovery of gold is expected. The Columbia Hydraulic Co. has struck a promising pay streak and its prospects are excellent. The Boulder Creek Hydraulic is maintaining its good record.

Slocan.—Ore of a character described by the Sandon *Mining Standard* as a rarity on Last Chance mountain has been found in the Last Chance mine, near Sandon. It is quartz occurring in very hard rock and freely mineralized with gray copper and ruby silver. Assay returns are stated to have ranged from 600 to 1,000 oz. silver to the ton. The paystreak is 6 in. wide and is said to be "holding out strong." The greater part of the tonnage heretofore produced by this mine has been a soft silver-lead ore. At a recently held meeting of the Last Chance Mining & Milling Co. the annual election of directors and officers resulted as follows: Directors—Dr. W. A. Hendryx, W. H. Stimson, Los Angeles, Cal.; Bigerstaff Wilson, Victoria, B. C.; Blake Wilson, Nelson, B. C., and Louis Pratt, Sandon, B. C. Dr. Hendryx is president and Mr. Pratt secretary-treasurer.

Development work has been resumed on the Minnesota Silver Co.'s Ivanhoe mine, in which 14 men are now at work A new strike has been made in the Mountain Consolidated mine, 3 ft. of high-grade ore having lately been encountered in a raise.

Crow's Nest Pass.—The *Frank Paper* states that plans for the proposed new tipple the Canadian-American Coal & Coke Co., Ltd., has announced its intention to put in at its colliery at Frank, southwest Alberta, have been received, and that tenders are being invited for its construction. It is stated that an outlay of about $80,000 will be involved in this addition to the plant, and that construction work is to be pushed to completion. In addition, a box-car loader is to be installed and large railway scales provided. The Canadian Pacific Railway Co. will shortly begin the rearrangement of tracks and switches necessary to give the requisite additional coal-shipping facilities.

Interviewed recently at Winnipeg, Mr. G. G. S. Lindsey, general manager of the Crow's Nest Pass Coal Co., Ltd., stated that the present production of the company's three collieries is more than 3,000 tons of coal per diem, and that when the steel tipple, now being erected at the Coal Creek mines at a cost with equipment of about $200,000, shall be completed, shortly, the output will be materially increased. The quantity of coke made is in excess of an average of 1,000 tons daily. It is claimed that the coke is of a quality equal to the best Connellsville coke, and it is used largely at the Amalgamated Co.'s smelters at Anaconda and Great Falls, Mont.; besides providing by far the greater part of that required by the smelters of the Kootenay and Boundary districts of British Columbia.

London. July 29.

It comes as a considerable surprise, after the rosy reports of a year ago, to find that the property of the Tyee Copper Co., Vancouver Island, is showing signs of exhaustion. Up till quite recently, it was supposed that the company's affairs were on an excellent footing. The orebodies were extensive and developing well, and the smelter was in full operation, making an excellent profit. Even Mr. Clermont Livingston's yearly report, written in May, does not hint at any necessity for modifying his opinion as to the future of the mine. However, the fact that the board has decided to cease dividends and to materially reduce the output, while special exploration work is being done, points to the loss of the orebodies at the lower levels. I must confess I do not like writing about this company. Four years ago, when I said that a smelter was to be put up because the ores themselves could not be shipped at a profit, I received a sound wigging, though my statement was one of actual fact. It is probable that, in certain quarters, my present remarks may not find favor. The control of the company has now changed hands, and Mr. Livingston's friends are in a minority on the board, so that the policy and methods will change to some extent. When it was found that the output had to be reduced, Mr. Loeffler, who put up the money for the smelter, etc., and is by far the largest shareholder, came forward and had something to say about the management and direction. The other shareholders have backed him up, and endorsed his policy. The company has large funds in hand, and the suspension of dividends will strengthen the position still more. I may mention that Mr. Loeffler is not a city man, but a man of means, who has large investments in many copper companies, and up to the present time he has never figured as a director of a company. There is, therefore, no suspicion of a market raid or city dodge in this change of control. The future of the Tyee Co. will be looked forward to with interest. There are plenty of funds in hand; the mine and smelter are carefully equipped. The duty now is to explore further the property of the company and to investigate other properties in the neighborhood, if such investigation can be done in the direct interest of the company itself.

General Mining News.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mining & Milling Co.—Work has been resumed on the main shaft of this mine at Jackson, and 150 ft. more will be sunk before another station is cut. This will make the shaft 2,850 ft. deep, it being already 2,700 feet.

EL DORADO COUNTY.

Rio Vista Copper Mining Co.—F. H. Harvey, of this company, is shipping some ore to Salt Lake to have it tested by the Blake-Morscher electric separator. Work progresses steadily at the mine.

MARIPOSA COUNTY.

Western Water & Electric Co.—Mr. W. L. Malcolmson gives us the following information as to the copper properties which have been taken over by this company, of New York organization. Incorporation under the title of the Green Mountain Consolidated Copper Co., with a capital of $5,000,000, is now complete The property, covering 686 acres, was first investigated in 1862, but owing to difficulties in transport, never became profitable. More recently development has been active, and eight shafts, with much drifting, have opened up the orebodies. With the extension of the Southern Pacific to Raymond, only six miles from the mine, investigation by eminent engineers—among them W. J. Adams, L. E. Aubury, State mineralogist; W. H. Routledge and Herbert Lang, engineer for the Mountain Copper Co., and for the Fresno Copper Co.—indicated a promising mine. The Southern Pacific has determined to extend its branch to the mine, and the company is preparing to erect a 500-ton smelter.

NEVADA COUNTY.

St. Louis.—This mine, formerly the Neversweat, at Nevada City, was recently bought by Dietrich & Fisher, who are extending the upper and drain tunnels started by the former owners.

Union Hill.—This mine is being reopened by a party of tributers, headed by H. J. Stewart, who are sinking a new shaft 1,200 ft. down the creek and also pumping out the old works.

North Bloomfield Mining Co.—This company, at North Bloomfield, is about to drift the old Badger hill claim, which was formerly worked by hydraulic process, in a rich channel.

Majestic.—This mine, at Rough and Ready, owned by John Hackett, is being re-opened. When formerly worked it paid well. The mine is being unwatered.

PLACER COUNTY.

Baltimore.—This old mine, Forest hill, is being worked by a large crew; a 50-h.p. gasolene engine has been installed.

Alameda.—The water has been pumped from this mine at Black cañon, and the property is about to start up with 40 men. The mine has been idle two years.

Hidden Treasure Drift Mining Co.—This mine, at Bullion, is being worked full handed night and day, about 140 men being employed. This is the largest drift mine in the State and the most profitable. Harold T. Power is the principal owner and president of the company.

PLUMAS COUNTY.

Drilling.—The drilling machine of W. P. Hammon, of Oroville, is to be set at work on Spanish creek, and from there up past Spanish ranch. The Quincy Water & Mining Co. owns much of this land, which is expected to be mined by dredges if the drill tests are favorable.

SAN DIEGO COUNTY.

Mesa Grande Tourmaline & Gem Co.—The 604 acres of tourmaline claims at Mesa Grande, owned by C. O. McCarroll, and adjoining the Tannenbaum claims, have been sold to this company.

Julian Consolidated Mining Co.—This company, already owning the High Peak and Julian mines, is negotiating for the Owens mine at Julian, which has recently been pumped out and is being re-timbered.

SHASTA COUNTY.

Great Western Gold Co.—The Afterthought smelter, of this company, is again about to start up, after a temporary shutdown of two weeks.

Delta Consolidated Gold Mines Co.—This company, in Dog creek district, has obtained control of the Delta mine and the Bacchus mine, including a small mill. They will also purchase Rickard group, in the same district, and are developing the Caledonia. An option is held on the Trinity Consolidated and its equipment on the south fork of Dog creek. A milling plant of 60-ton capacity is to be erected.

SIERRA COUNTY.

Last Resort.—Rich sulphurets have been found in this mine at Downieville.

Poker Flat Gold Mining & Milling Co.—This company is reducing its capital stock from 1,000,000 shares to 100,000. E. L. Plincoe has been appointed manager. The gold in the ore of this mine is difficult to save.

SISKIYOU COUNTY.

Wintering & Willard.—Work has been commenced on this mine, at Taylor creek, by those holding the bond on it. The lower tunnel is to be continued to the ledge.

Hardscrabble.—This mine, on China Gulch, an extension of the Advance, has been placed under bond to F. H. Osgood, of Seattle, Wash., and is to be worked on an extensive scale.

TRINITY COUNTY.

Beaudry.—This mine, at Minersville, owned by F. Beaudry, has been bonded to William Stover, of the Unity mine, who will use a hydraulic elevator to work the low ground where the old town of Minersville once stood.

Wallace.—L. J. and J. C. Wallace have sold this mine on Steiner's Flat, near Douglas City, to Lorenz Brothers.

Brown Bear.—The half interest of the Phillips estate in this old mine at Deadwood has been sold for $15,000 to Thomas McDonald. The mine has been worked by lessees for some years, but will doubtless now be worked by Mr. McDonald and the Watts heirs. There is a mill, compressor plant and much machinery on the property. The mine has been a large producer for many years.

TUOLUMNE COUNTY.

Santa Ysabel.—Superintendent E. C. Loftus will shortly start up 10 stamps of the mill to test the values in a body of low-grade ore recently uncovered.

COLORADO.

GILPIN COUNTY.

United Mining & Exploration Co.—This company, operating the Modoc mine in Nevada district, is preparing to install heavier machinery and erect larger shaft-buildings. A large body of free-milling ore has been opened up in the 200-ft. levels, running between 2 and 3 oz. gold per cord. Frank Straub, Jacobson Building, Denver, is manager .

Pewabic Consolidated Mines Co.—Manager J. C. Fleschhutz, of Central City, has arranged for new and larger buildings on the Iron shaft, the installation of an 80-h.p. hoist and a four-drill air compressor. The shaft is down 600 ft. and is to be sunk to the 1,000-ft. point. Daily shipments from the Pewabic shaft to New York mill average 60 tons.

Japan.—R. H. Hastie, Jr., of Denver, has taken a lease and bond on this property, in Russell district, and in sinking the shaft has opened up between 4 and 5 ft. of mineral which mills at the rate of $12 per ton. Machinery and buildings are to be put up at an early date.

Lillian.—R. Hughes, of Russell Gulch, who is leasing on this property, shipped last week milling and smelting ores which brought him at the rate of $80 per day, after paying days wages to his helper. The orebody has opened up at a depth of 350 ft. and promises well.

Penn Mill.—C. E. Holland has installed a dynamo and is experimenting with an electric process for saving the values from the creek slimes and tailings along North Clear creek.

CLEAR CREEK COUNTY.

Gold Anchor.—Manager T. Slater, Alice, has returned after a visit to the East to consult with his company, and the decision is to erect a concentrating mill near the mine, for which plans are to be drawn out at an early date.

Fort Dodge.—A company is to be formed for operating this property, on Leavenworth mountain, near Georgetown. The group consists of six claims, developed by a tunnel.

Amanda.—Pennsylvanians have made an arrangement to operate this group, owned by I. L. McLyman, of Georgetown, who will be manager. Good milling ores have been opened and the company may decide on a new mill. The purchase price is $40,000, a part payment being made down when the parties took hold.

Krupp Mining & Milling Co.—Ohio parties have become interested in the Binghampton and Lincoln groups and F. N. Tucker, Georgetown, has charge of the proposed developments, including the installation of a plant of machinery. The deal called for a consideration of $20,000 in all.

Idaho Springs Shipments.—A total of 245 carloads of ores and concentrates were shipped during June to the Denver smelters, being an increase of 40% over corresponding month of last year.

International Mining Co.—Developments are opening up good orebodies in the Ocean Queen property, and the main shaft is to be sunk 300 ft. deeper. Daily shipments are being made of milling and smelting ores and the property is a dividend payer. The stockholders are considering the matter of erecting a 100-ton mill on their own property. S. D. Slyder, Idaho Springs, Col., is manager.

Colorado-Central and Aliunde Group.—S. A. Maxwell, of Georgetown, has taken a lease and bond on this well-known property, the bond calling for $500,000 and running for three years. The property is owned by H. M. and Willard Teller, of Denver, and by Eastern parties, and is credited with a large production in the past.

BOULDER COUNTY.

Inter-Ocean Mining Co.—Easterners are interested in this company, operating the Inter-Ocean, at Sunshine, and they will soon commence the installation of a roasting and cyanide plant near the property.

FLORIDA.

Peace River Phosphate Mining Co.—According to a report in the *American Fertilizer*, this company will move its plant up the river to some point at or above Zolfo and resume operations in that vicinity. It will be compelled to provide some way for transporting the phosphate from the works to vessels off Punta Gorda, and instead of building the railroad on up the river from Arcadia to Zolfo, hauling the phosphate on cars to Cleveland, and there loading it on barges to be towed to the ship, as at present, it has been decided to place the rock on the barges where it is mined and tow it to the vessel off Punta Gorda. This will necessitate a depth of about 8 ft. of water from Zolfo to Punta Gorda, and it is the intention of the company to dredge Peace river to make it navigable to tugs and barges.

IDAHO.

IDAHO COUNTY.

E. F. Gordon, vice-president of the Vendetta & Orogrande Mining Co., writes from Orogrande: "We have an interesting country here, large bodies of medium-grade gold ore, that heretofore have not been profitably worked by amalgamation methods, but now are giving surprising results by the cyanide process. On the Vendetta & Orogrande Co.'s ground we have a body of ore 1,000 ft. long, 800 ft. wide, and it will be 500 ft. high above the crusher floor of our mill, which will be installed this season. This body of ore will average $4 per ton in gold. We can mine this ore by quarrying methods for 13c. a ton, and can mill it for less than $1 a ton, and save 90% of the assay value right along. The ore occurrence is in an intensely sheared and altered zone of the old crystallized gneiss, accompanied by eruptive dikes of phonolite. Tellurides occur, but the prevailing mineral is a plain iron sulphide. Central Idaho is young as a quartz-mining country, but has a record as a placer producer."

ILLINOIS.

ST. CLAIR COUNTY.

According to *Fuel*, options on the 12 large coal mines between East St. Louis and Centralia, Ill., on the Southern road and on 40,000 acres of coal lands near and about these mines, have been secured by a syndicate of St. Louis and Belleville capitalists, who, it is believed, will form a $2,000,000 corporation and take over the properties early in August. This syndicate, it is said, also has options on most of the mines along the Illinois Central and the Baltimore & Ohio Southwestern railroads. Of the mines on which options are said to be held, 3 are located along the line of the East St. Louis & Suburban railroad, 11 on the Baltimore & Ohio Southwestern, and 25 on the Illinois Central. Most of these mines are large ones. In cases where owners have refused to sell, it is said, options have been taken on the surrounding coal lands, with a view to forcing the sale if possible.

No deeds have, as yet, been passed, and it is said that none will be passed until August, which will give to the members of the company time to form their corporation. The $2,000,000 worth of bonds necessary to pay for the properties, it is said, have all been subscribed for. The mines, which will be thus brought under one control, include some of the largest in the Belleville district. Among them are the Muren mines at Belleville and New Baden and the Maule mines at Belleville and Shiloh.

FRANKLIN COUNTY.

Ziegler.—The large colliery at this place, which has become noted for the prolonged labor troubles there, is on the market. The latest report is that the Leiter estate has arranged a sale of the property to an English syndicate.

INDIANA.

At a hearing before the Indiana Railroad Commission it was discovered that a certain railroad charges 35c. a ton for hauling coal 70 miles, and the road to which it is turned over charges 60c. a ton for hauling it 5 miles. The Indiana coal men are asking for a reduction and abolition of discriminating rates. It is expected that future hearings will reveal some interesting matters relating to rate agreements.

The Indiana State Tax Board is investigating the decreased valuation of taxable property in Sullivan, Grant, Blackford and Madison counties. In spite of the great development of the coalfields in Sullivan county the decrease there is $276,000. Even larger decreases are reported for Grant, Blackford and Madison. The failure of natural gas is given as an excuse for the three counties last named, but since all are producing great quantities of oil, the board is inclined to raise the assessment materially. Knox county, which adjoins Sullivan on the south, also a coal county, increased its assessed valuation nearly a million dollars. It is expected that Sullivan county will receive careful attention from the board, since it is known that syndicates have recently invested millions of dollars therein.

KENTUCKY.

Western Kentucky Coal Co.—This new company has closed a deal for a large tract of coal land in the Big Sandy district of Kentucky, and will begin to develop at once. The stock of the company is owned by the North American Company.

BELL COUNTY.

Yellow Creek Coal Co.—This company, represented by J. D. Wills, of Middlesboro, has leased 500 acres of coal lands from the Innes estate. The property adjoins that of the Nicholson Coal Co., and is said to contain a vein of coal more than 6 ft. in thickness.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—The daily output here is about 30,000 bbl., and crude sells at 15 to 17c. The principal producers at present are the Producers' Oil Co., Morse Oil Co., Crowley Oil & Mineral Co., Heywood Oil Co., Carnes, Bass & Benckenstein, Rex Oil Co., Wilkins Oil Co. and Sharp Oil Co. Wells drilling are Rex Oil Co. No. 2, Tierce No. 4, Carnes & Co. No. 4. The wild-cat being drilled by the Dusons, one mile north of Crowley, had a blow-out. The owners appear confident that they will get a gusher, although their No. 1 well was abandoned.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Franklin.—Another diamond drill hole has been started at the Junior branch, where explorations are being conducted to locate the southerly extension of the Kearsarge amygdaloid lode. Two holes

were sunk and abandoned at a depth of 500 ft. without locating the lode, but the management expects the new hole to strike it. No 2 shaft is opening good ground in its lower levels.

Globe.—Rapid work is being accomplished in sinking the shaft on this property, owned by John Stanton, of New York, and under option to the Copper Range Consolidated Co. The opening has attained a depth of 40 ft., which is an excellent record considering the heavy overburden.

As a result of the great activity in Keweenaw county a re-survey of the shore lines and hydrography of Keweenaw point is being made under direction of the United States lake survey. A complete survey of Keweenaw point has not been made in several years and many of the maps now in use are inaccurate.

KEWEENAW COUNTY—COPPER.

Ahmeek.—Rock shipments now average 240 tons daily. Returns are excellent and development work is being pushed steadily. Within the next few months ,or after the completion of the enlarged surface facilities, the mine will be in a position to increase its production and make a better showing.

Keweenaw Copper Co.—Results from the exploratory work on the Mandan and Medora properties are encouraging. These tracts have been selected from among the large holdings of the company as presenting the best prospects of carrying the northerly extension of the Kearsarge amygdaloid belt.

Keweenaw Central Railroad.—Construction work is being pushed rapidly, and a large portion of the grading has been finished. Steel will be delivered in a few weeks, when track-laying will commence.

Mohawk.—Machinery for the steeple compound head to be installed at the mill is being shipped by the Nordberg Manufacturing Co., of Milwaukee. Work on the foundation for the new head, which makes the fourth to be installed, is completed. The capacity of the plant will be increased approximately 650 tons per diem by the addition of the fourth head.

ONTONAGON COUNTY—COPPER.

Adventure Consolidated.—A crew of men has been started trenching across the strike of the formation from north to south at a point 300 ft. east of No. 3 shaft. The explorations are on the old Hilton property and some copper rock has already been opened. No. 3 shaft has been opened to accommodate two skips to the tenth level. The cutting down of No. 3 shaft from one to two compartments shows the confidence of the management in its values. At No. 1 shaft, the westerly opening, there have been intermittent periods of activity since last fall. A few drills are at work exploring the ground and from time to time, as sufficient accumulates, the rock is shipped to the mill.

MONTANA.

BEAVERHEAD COUNTY.

Silver Fissure.—This property is situated at Polaris, 45 miles from Dillon. Development shows good bodies of silicious silver ore and the management contemplates erecting a matte smelter. To collect the values it may be necessary to ship from other sources some copper ores to mix with the charge. Dr. J. S. C. Wells, of Columbia College, who is interested, was recently at the mine.

JEFFERSON COUNTY.

Basin Reduction Co.—The concentrating plant of this company is at Basin, 30 miles north of Butte. It is controlled by F. A. Heinze and operates on ore from his Butte mines. Shipments to this mill amount to 1,500 tons of ore per day. Of the concentrate product, 83% is saved by the jigs, 12 to 13% by the regular tables, 3½% by the slime tables and 1½% by belt machines. There are 2 crushers, 8 sets of rolls and 4 Huntington mills. The last named re-grind the jig middlings. There are 90 Hartz jigs. The fine jig tailing and slime are concentrated by 60 Wilfley tables, the feed for the latter passing through settlers. The overflow from the latter and the Wilfley tailing pass to 80 cone-shaped iron tanks, designed and patented by J. M. Callow, of Salt Lake City. Each tank is 9 ft. in diameter and 8 ft. deep, having an overflow launder at the top and a discharge pipe at the bottom. The slime enters through an open cylinder at the top. The settlings pass to a sump, being raised thence by a centrifugal pump to a central distributor which discharges it upon 30 Wilfley tables, which make a slime concentrate. The tailing from this group of tables is reconcentrated by belt tables, designed by W. A. Kidney, mill superintendent.

NEW MEXICO.

DONA ANA COUNTY.

Bennett-Stephenson.—The new double compartment shaft on this mine at Organ is down 50 ft. It is to be sunk to a depth of 400 ft. and possibly 600 feet.

GRANT COUNTY.

Bear Mountain.—This district, 9 miles from Silver City, is again drawing the attention of prospectors. R. F. Clark, of Silver City, is developing the Red Cloud, which he located several months ago. He has a good showing of silver ore. There is also a vein of cinnabar on the property. The rains of recent years have washed away the surface, leaving the country rock exposed in many places. A good wagon road connects the district with Silver City and there is plenty of timber and water on the ground.

Burro Mountain Copper Co.—This company has received its new pump and a 30-h.p. boiler, which will be put at work at once in Deadman's Gulch.

SIERRA COUNTY.

Black Peak Gold Mining Co.—This company has received its hoist and material for the tanks, and the engine is expected to arrive shortly.

Moffitt Mining & Milling Co.—This company is carrying on development work on a group of mines near Kingston. Machinery has been bought for a 50-ton plant.

SOCORRO COUNTY.

Last Chance.—This mine, at Mogollon, has the only mill now in operation in the district. It is making regular shipments of concentrate and bullion.

NORTH CAROLINA.

JACKSON COUNTY.

Cullowhee Mining & Reduction Co.—This new company has completed organization with S. B. Ezell, of Spartanburg, S. C., president; D. D. Davies, vice-president; and Thomas C. Cox, secretary, both of Cullowhee. The company has purchased the property of the old Cullowhee Copper Co., consisting of 1,300 acres of land, with the mines, water power, steam drills, hoists, pumps, etc. The new company proposes to put in an electric plant, operated by water power.

MACON COUNTY.

Franklin Mica & Realty Co.—This company has been incorporated to develop mica and kaolin property near Franklin. M. D. Billings, S. L. Kelly and I. N. West are the incorporators.

PENNSYLVANIA.

BITUMINOUS COAL.

A syndicate, headed by H. K. Wick, of Youngstown, O., is arranging a merger of the independent coal companies along the line of the Pittsburg, Bessemer & Lake Erie road, in Butler and Mercer counties. The mines so far secured are those of the Enterprise and the Shenango Co. at Grove City; the Pardee Co., at Pardee; P. D. Sherwin, at Euclid; Ellis Blum and the Turner Co., at Ferris; the Butler Co., at Jamesonville, and G. G. Stage, at Claytonia. The Great Lakes Coal Co. will not be included in the consolidation.

Westmoreland Coal Co.—This company, at Irwin, has just finished its largest exhaust fan in the Irwin field at its Shafton mine. It is driven by a 40-h.p. engine. At its export mine work has been started on a steel tipple that will serve its two mines, so that five cars on as many tracks can be loaded at one time.

Carnegie Coal Co.—This company has absorbed the Chartiers Coal & Coke Co. The reorganization has been perfected as a close corporation with a paid-up capital stock of $500,000, and the following officers elected: R. P. Burgan, of Carnegie, Pa., president and general manager; J. T. M. Stoneroad, of Pittsburg, secretary and treasurer; George M. Hosack, of Pittsburg, vice-president. This merger

makes the company the largest producer in the Pittsburg thin vein district proper, outside of the Pittsburg Coal Co. The new company will operate its three most economically equipped plants and owns 1,750 acres of coal and 500 acres of surface property. These properties are within 5 miles of each other and all within 20 miles of Pittsburg, in the Panhandle coalfield.

Pittsburg Coal Co.—The promised statement of this company has been issued. It covers the half-year ending June 30, including the operations of all subsidiary concerns, except the Monogahela River Consolidated Coal & Coke Co. The total coal mined for the half-year was 6,632,425 tons, of which 6.075,946 tons was Pittsburg and 556,479 tons Hocking coal. The coke made was 168,236 tons. This shows an increase of 1,178,177 tons of coal and 82,062 tons of coke, as compared with the first half of 1904. The net earnings, however, decreased from $1,660,327 in 1904 to $1,136,333 this year, a loss of $523,994. The average net per ton of coal mined was 30.4c. in 1904, and 17.1c. in 1905. The financial statement for the half-year is as follows:

Profits	**$1,475,733**
Royalty on coal mined	$276,060
Renewal fund	63,339
Interest on bonds	609,100
Total charges	**$948,499**
Net balance	**$527,234**
Preferred stock dividend No. 21	**514,915**
Undivided balance	**$12,319**

The quick assets on June 30 were: Current cash, $1,277,770; cash in sinking fund, $552,725; accounts and bills receivable, $7,983,899; coal, etc., on hand, $4,052,449; total, $13,866,843. Against this is $9,998,050 accounts and bills payable, and $609,100 bond interest due; a total of $10,607,150, leaving a balance of assets amounting to $3,259,693 net.

The general statement says: "The business of your company suffered considerably during the earlier months of this year on account of unprecedented competition in the bituminous trade, in which your officers had to meet very low prices made by competitors locally and in adjoining fields, in order to retain the business that may properly be considered as belonging to the mines of the company. These low prices resulted in decreased earnings, so that your directors felt constrained to defer payment of dividend on the preferred stock for the second quarter of the year. These conditions were carefully considered and it was hoped that recovery was near at hand, and that the earnings for the full half-year would meet the dividend requirements for that period. These expectations were not realized, and while an improvement in the situation is noticeable, the progress toward better prices and more satisfactory earnings has been slower than was anticipated. In the history of the company the earnings for the second half of the year have always considerably exceeded those for the first half, and there is no reason to expect that this year will be an exception. It is recognized that an increased working capital is desirable and your directors deemed it, therefore, inadvisable to draw upon the accumulation of previous years for dividends, but rather to devote the surplus earnings of the company in excess of the requirements for bond interest and other fixed charges to the building up of its working capital. On July 20, out of the sinking fund there were purchased for retirement 271 first-mortgage bonds, which, together with 636 bonds so purchased on January 20, makes a total of 907 first-mortgage bonds now retired.

"On April 20 a contract was made with the United States Steel Corporation and its subsidiary companies covering a period of 25 years, during which time they agree not to open any new mines and to discontinue the shipment from coking plants of coal to be used for steam and gas purposes. This contract is one of great mutual benefit; the Steel Corporation being assured of a supply of coal of such quality and by such delivery as is required for its varied interests, and, as the cost of mining depends largely upon the volume and regularity of operation of the mines, in securing such large tonnage we reduce the cost of our entire output. By reason of the fact that the Steel Corporation is this year taking a considerable quantity of its requirements of Pittsburg coal from our competitors under contracts which had been made at the time our contract was closed, we have not as yet entered upon the full benefits to be derived from the large and steady tonnage which this contract assures. The prices, terms and conditions of this contract are satisfactory to your officers, and the making of the contract was authorized by unanimous vote of your board of directors. In fact, no action of importance has been taken except by the authority and unanimous approval of your board of directors."

SOUTH CAROLINA.

Central Phosphate Co.—This company is getting good results from its two dredges on the Coosaw river. A recent return reached 1,100 tons of phosphate in one week.

GREENVILLE COUNTY.

Eureka Monazite Co.—This company has been organized to work placers for monazite. The office is at Greenville, and G. A. Browning is manager.

SOUTH DAKOTA.

PENNINGTON COUNTY.

Clara Belle Mining Co.—At a meeting of the directors of this company, held in Cleveland July 1, the following officers were elected: Frank Hebert, president; U. P. Bowler, vice-president; A. R. Teachout, treasurer; L. Hebert, secretary; Walter Lister, assistant secretary. This company is now improving the property, erecting a first-class stamp-mill and sawmill, building a tramway, erecting a large boarding-house and other buildings. About 25 men are now at work and more will be put on soon. It is intended to have the mill in operation within a short time. The property consists of 180 acres, one mile from Oreville, near Hill City, on the Burlington Railroad, in the southern part of the Black Hills. The work is an important one, and will help very much to develop the country in the south part of the Black Hills.

TENNESSEE.

CUMBERLAND COUNTY.

Mend's Gap Coal & Coke Co.—This new company will develop a tract of 3,000 acres of coal land at Waldensia. H. L. Badham, of Birmingham, Ala., is head of the company.

TEXAS.

HARDIN COUNTY.

Saratoga.—New wells: Britton Oil Co., flowing about 400 bbl.; Texas Co., flowing about 200 bbl. Wells drilling: Sun Oil Co., on Petty lease, down 700 ft.; Guffey Petroleum Co., well down 750 ft.; Texas Crude Oil & Mineral Co., expected in daily. Rio Bravo Oil Co. well No. 214 has been abandoned at 1,900 feet.

HARRIS COUNTY.

Humble.—New gushers reported are: Beatty well on Gaffney lease, flowing 5,000 bbl.; Harper & Swayne well, flowing 3,000 bbl. per day. The loss by the recent fire, based on the present price, is about $350,000, inclusive of pumping plants. The heavy losses were fortunately sustained by companies financially strong. The loss of life is regretted, but large as the amount of oil consumed appears, it is less than a month's production for this field and the destruction will entail no shortage to consumers and will probably have only a slight effect on present prices.

JEFFERSON COUNTY.

Beaumont.—Andrews & Burrows No. 1, brought in July 16, is the first well in Spindletop field west of the railroad and widens the field 200 ft. The well is about 1,000 ft. deep and situated on a flat off the hill. Capacity not definitely known; probably 250 bbl. W. A. Meagher has leased all the Jefferson county wells of the Higgins Oil & Fuel Co., paying the lessors 25% royalty.

The continued heavy output has caused another decline in crude prices. Crude is now so low that there is little, if any, margin of profit on pumpers, many of which may be shut down. The gusher output will, however, be maintained until development is curtailed. The newly-posted quotations are as follows: Spindletop, 30c.; Sour Lake, 26@28c.; Saratoga, 22c.; Batson light, 26c.; Batson heavy, 20c.; Humble, 13c. per barrel.

WASHINGTON.

FERRY COUNTY.

Oversight Mining & Milling Co.—This company has decided on driving the west-side tunnel on the Oversight claim 100 ft. farther along the footwall of the vein and then raising to the surface on the glory-hole system of mining and taking out ore for shipment to the smelters. A crosscut from the present end of the tunnel has intersected only 39 ft. of the vein, which has been ascertained to be about 60 ft. wide. The ore so far developed carries an excess of iron and about $10 value in gold, copper and silver, the last named being in the smallest proportion. A survey has been made for a branch of the Belcher Mountain railway to this property, and the company will get ready to ship ore as soon as the road is built. The management has in view the installation of an air compressor and power drills for the work laid out; also a steam hoist, to be used at the Great Northern shaft, which is situated about 1,000 ft. south of the tunnel. This shaft is down about 20 ft. on a solid body of ore, which assays up to $20 a ton in gold, silver and copper, with sufficient iron to make it desirable for smelting.

WEST VIRGINIA.

New River & Pocahontas Consolidated Coal Co.—This company has recently purchased from Col. W. P. Rend a large body of New River coal near Thurwood, W. Va. on the Chesapeake & Ohio. This property has four well-developed mines in operation, and the capacity of these will be largely increased. Contracts have been placed for a complete electrical power plant, by George R. Wood, of Pittsburg, consulting electrical engineer for the company. The Westinghouse Electric & Manufacturing Co. was awarded a contract for three 300-kw. engine-type three-wire generators, with complete switchboard equipment. Dravo, Doyle & Co. will furnish three 600-h.p. cross-compound Erie Ball engines, to operate non-condensing, and a contract has also been placed for three 300-h.p. Stirling water-tube boilers. This plant will operate mining machines, locomotives, fan and pump motors, etc., and will be the largest electrical coal plant in the New River district.

WISCONSIN.

GRANT COUNTY.

Empire Mining Co.—This company's statement for the three months ending May 31 shows receipts as follows: Balance, March 1, $2,940; sales of ore, $59,762; miscellaneous, $233; total, $62,935. The expenses for the quarter were: Fuel, $1,958; labor, $8,566; powder, $1,262; mill account, $552; salaries, $479; rent, $5,412; miscellaneous, $669; total, $18,898. This leaves net earnings of $44,037, from which the sum of $2,750 was transferred to reserve fund, and dividends amounting to $37,500 were paid; a total of $40,250, leaving a balance of $3,787 forward to current quarter. There is now $6,000 in the reserve fund.

Foreign Mining News.

AFRICA.

TRANSVAAL.

The gold output for July is estimated at 425,000 oz. fine, which is 12,700 oz. more than in June, and the highest monthly production on record. The figure may be changed slightly by the complete returns. This makes a total for the seven months ending July 31 of 2,785,325 oz. fine gold, or $57,572,668 in value.

CANADA.

ONTARIO.

A discovery of silver cobalt ore is reported near Massey, on the Whiskey Lake copper property of John A. Montague, of Sault Ste. Marie, Ont. The formation is stated to be the same as that of the Cobalt area, whence it is inferred that the belt may extend right across New Ontario. So far, the Bureau of Mines has received no confirmation of the report.

Coal Trade Review.

NEW YORK, Aug. 9.

ANTHRACITE.

The hard-coal market remains in its condition of mid-summer dullness; sales are almost at a standstill, but improvement is looked for in September, with possibly a slight flurry toward the end of this month in order to profit by the last remaining 10c. discount. To counteract the previous over-production, many mines are being closed down; the Lehigh Valley has been closed all this week, and other regions will end the week's work to-night.

The most important subject in the coal trade just now is the attitude of the United Mine Workers toward their action at the termination of the present agreement on the first of next April. The President will address a large meeting of the miners at Wilkes-Barre on Thursday evening. As his was the hand that brought the arbitration board into being and settled the long strike of 1902, and as he is directly responsible for the present agreement between miners and operators, his speech will be listened to with the most profound interest. A consensus of opinion taken among the steadier and more reliable workmen of the anthracite field reveals the fact that a large majority of the union men are strongly opposed to any violent break with the operators next spring, much preferring to renew the present agreement. The hot-headed and irresponsible members of the union, however, have always, and probably will, dictate the action of the United Mine Workers.

Prices for the month of August will remain at $4.65 for broken and $4.90 for domestic sizes, f. o. b. harbor shipping points. Steam sizes are in good supply at the same prices as last week: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice, and $1.30@$1.35 for barley.

Anthracite shipments in July are reported at 4,546,000 tons; a decrease of 1,298,052 tons, as compared with June, and of 77,527 tons, as compared with August, 1904. For the seven months ending July 31 the total shipments were 33,880,734 tons in 1904, and 35,262,997 tons in 1905; an increase of 1,382,273 tons this year.

BITUMINOUS.

Reports from the Atlantic seaboard soft-coal trade seem to indicate a better tone. Producers in some regions have contracted pretty closely to their capacity, and if they are having trouble to fill their orders at this time, as is reported, delays may be looked for in deliveries later on, when difficulties present themselves, and demand becomes more acute. Prices do not show any improvement; in fact, the poorer grades are sometimes selling below cost in order to dispose rapidly of coal on the way. Transient business is of small importance, contract trade accounting for most of the shipments; contractors are placing their orders now in order to take advantage of the low ocean freights. Some producers are threatening to take on no more business at present, having all that they can attend to. Such action would improve the position of the lower grades by increasing demand for them, raising their price to a remunerative basis.

Trade in the far East shows an improved demand, although it is generally slow, except in some cases. Trade along the Sound is increasing in volume to a marked extent. Dealers who supply this trade state that, with the small shipments forwarded during the last months, when demand arises, many consumers will have to go short for a period in order to distribute the supply evenly; this has stimulated buying. Trade in New York harbor is quiet on transient business, but slightly more active on contracts. Some low-grade coal has been selling around $2.10, but ordinary steam coals have been bringing about $2.25 f.o.b. New York harbor shipping points. All-rail trade continues good, while increased demand is reported from some quarters. Car supply has been reported short in some districts. Transportation has been generally slow, considerably behind schedule.

Some loading ports are reporting a firmness in ocean freights and a lack of moderate-sized vessels. Philadelphia quotes as follows: To Boston, Salem and Portland, 65@70c.; to Providence, New Bedford and the Sound, 55c.; to Lynn, Saco and Gardner, 90c. and towages; to Newburyport, 80c.; to Portsmouth and Bath, 70c.; and to Bangor, 85c. New York rates are 55c. to around the Capes, and some vessels have sailed light to the East, failing to obtain these prices.

COAL TRAFFIC NOTES.

The coal traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the seven months ending July 29 was as follows, in short tons:

	1904.	1905.	Changes.
Anthracite.....	2,610,563	2,660,984	I. 50,448
Bituminous... .	15,385,645	16,208.756	I. 823,111
Coke..... ..	4,855,006	6,266,667	I. 1,411,661
Total.....	22,851,187	25,136,407	I. 2,285,220

As in previous months, the important gain is in coke, which shows an increase of 29.1%, the total increase this year being 10%. This is an incident of the activity in the iron trade.

The Pittsburg Coal Co. reports its business for the half year ending June 30 as follows, in short tons:

	1904.	1905.	Changes.
Pittsburg Dis...	4,916,524	6,075,946	I. 1,159,422
Hocking Dis....	537,724	556,479	I. 18,755
Total coal...	5,454,248	6,632,425	I. 1,178,177
Coke.....	86,174	168,236	I, 82,062

This shows a gain of 21.6% in coal; and of 95.2% in coke shipments. The average prices realized were less in 1905 than last year.

Birmingham. Aug. 7.

The coal production in Alabama is holding up well. The strike of the union coal miners is still on and the leaders assert that the production at such mines as are affected by the strike is far below the usual normal output. The furnace companies, who operate these mines, declare that they are getting out a better coal output every week and in a short time will have reached the normal amount. There is a demand for all the coal that can be mined. The furnaces are requiring no smal amount, while other industries and the railroads are enjoying a steady operation and requiring much coal. The mines operated with union and convict labor have been working steadily and the production at these places is positively on the increase.

Chicago. Aug. 7.

As is normal for the midsummer season, the coal business is dull. There are dealers that say it is worse than dull; they point to the low prices, the oversupply of Western coals and the constant bunching of too much coal of one kind in the local market, with profitless results, and say that competition has killed itself —that some form of combination must arise or the business will be demoralized.

The present conditions are but a repetition of what happened last summer and the summer before, except for anthracite. Both Eastern and Western coals may be expected to be without heavy sales now, but anthracite, under the graduated system of discounts, should sell fairly well in August. It is in such light demand that prices are cut in some cases 20c.@30c., to avoid demurrage. The reasons for the light demand are obvious; they are the great prosperity of the country, which makes a saving of the discount seem unimportant to the consumer; increased transportation facilities, which make the consumer feel that he can get coal when he needs it; the confidence inspired by the mild winter of 1904-1905, and the growing use of bituminous in place of anthracite.

Prices on all grades of Western coals are down, seemingly as low as they can get this year. Lump from Indiana and Illinois mines brings $1.60@$1.85; run-of-mine, $1.50@$1.70 and screenings $1.10@$1.40. Eastern coals, including Hocking, are firmer than Western, but all are doing a light business, with no material change in prices and no prospect of better conditions until September.

Cleveland. Aug. 8.

By September an advance of 10c. a ton will be announced on the price of Lake three-quarter coal. The demand here of late has been improved, and heavier sales have been made in the Northwest. Shipments, however, have not yet increased, and in consequence the lake movement is somewhat laggard. The better tone to the market has been brought about by information that there is yet to come a good buying movement from the Northwest, which indicates that the late fall movement will be unusually heavy. The shippers are aware that they will have plenty of boat capacity for their fall movement, and are not concerned about the carrying rates, which remain at 30c. to the head of the lakes and 40c. to Milwaukee. The price of Lake three-quarter coal holds at $1.90 f. o. b. boat Lake Erie ports, which is rock bottom for the year.

The demand for steam coal of run-of-mine grade has not improved to any extent, and there is the same old struggle between the demand and production, operators having difficulty to keep the capacity of their mines down to the current needs of the trade. The price of this coal has not changed from 90@95c. at the mines. Slack is in good demand, with the Pennsylvania product selling at 50c. at the mines, and the Ohio slack at 60@65c. at the mines.

The demand for coke is slightly improved, with the best grades of 72-hour foundry coke selling at $2.50 at the oven, but with some of the other cokes holding at $2.35 at the oven. The best grades of furnace coke are selling at $2 at the oven.

Pittsburg. Aug. 8.

Coal.—Prices have stiffened somewhat since the advance ordered by operators in the Hocking Valley district. Run-of-mine is quoted this week at $1@$1.05 at the mine, and $1.10@$1.20 is asked for ¾-in. coal. A number of the railroad mines of the Pittsburg Coal Co. are idle, but all the mines of the Monongahela River Consolidated Coal & Coke Co. are in full operation. The mines of independent concerns also are running.

Connellsville Coke.—Prices remain about the same, furnace coke being quoted at $1.85@$2, and foundry at $2.35@$2.50. The production for the week is given at 248,779 tons, and the shipments aggregated 10,867 cars, distributed as follows: To Pittsburg and river points, 4,132 cars; to points west of Pittsburg, 5,514 cars; to points east of Everson, 1,221 cars.

San Francisco. Aug. 3.

Notwithstanding the light receipts of Australian coal this year, there seems to be a sufficient supply. As this coal is used chiefly for steam purposes, this is another illustration of the extensive use of fuel oil in manufacturing establishments and on steam vessels.

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

. Aug. 9.

Exports of fuel from Belgium for the six months ending June 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Coal	2,302,290	2,183,535	D. 118,755
Coke.....	438,422	512,260	I. 73,838
Briquettes....	271.464	237,370	D. 34,094
Total.....	3,012,176	2,933,165	D. 79,011

These exports were chiefly to France and Germany. The imports for the half-year were as follows:

	1904.	1905.	Changes.
Coal.....	1,815,137	1,937,955	I. 122.818
Coke.....	173,876	181,088	I. 7,212
Briquettes.....	22,576	26,554	I. 3,978
Total.....	2,011,589	2,145.597	I. 134,008

The principal imports were from Germany.

The total imports of coal at the port of Genoa, Italy, in 1904 amounted to 2,355,465 tons, as compared with 2,493,970 tons in 1903 and 1,867,607 tons in 1894. At Savona, the imports of coal last year were 773,040 tons; in the previous year they were 799,577 tons, in 1894, 469,928 tons. The imports of coal and coke at Spezia in 1904 were 254,695 tons, of which 245,000 tons came from Great Britain.

Iron Trade Review.

NEW YORK, Aug. 9.

The temporary lull reported last week has passed over, and buying of pig iron has started up in a way quite unusual for midsummer. Apparently buyers have satisfied themselves that fall business will be good, and they do not want to be caught with short supplies on a rising market.

Finished material also shows well in most lines. Structural material and plates are in special demand, and there is much complaint of delay in deliveries on contracts. Some of the smaller independent mills are asking—and getting—premiums, where they can make deliveries wanted. There are reports of several large orders for steel cars, which will increase the demand largely.

The railroads are also coming forward with rail orders, and a large tonnage is now assured for the rail mills, some of which will have to go over into next year. One order noted is for 45,000 tons for the Louisville & Nashville Railroad; these rails will be basic open-hearth steel, and will be made at the Ensley plant of the Tennessee Coal, Iron & Railroad Co., in Alabama.

A general strike has been ordered against the American Bridge Co., the difficulty arising from the sub-letting of some New England contracts by the company. The strike is likely to cause annoying delays, as the company has much pressing work on hand.

Birmingham. August 7.

While the sales of pig iron were not so active during the past week the market is still strong and the Southern furnacemen are in a good frame of mind. The active business of the two weeks preceding August gave a better aspect to the situation and the conditions are considered quite favorable. Quotations are quite firm, though during the week some iron of the lower grades was sold at a reduction. All the companies booked a large number of orders during July and are now making efforts to deliver thereon. The production has been increased by the blowing in of one furnace recently. Three other furnaces will go into blast before the end of this month, and early next month a fourth furnace will be started up.

The following iron prices are given: No. 1 foundry, $12.50; No. 2 foundry, $12; No. 3 foundry, $11.50; No. 4 foundry, $11; gray forge, $10.50@$10.75; No. 1 soft, $12.50; No. 2 soft, $12.

There is no change in the reports from the steel plants in this section. The rail deliveries by the Tennessee Coal, Iron & Railroad Co. are steady. The hot weather and labor scarcity are still felt at the Ensley steel plant. The Alabama Steel & Wire Co. is finding a good market for its woven wire and other products. The Empire Plow Co. is making preparations to start up the plant at Ensley in the next few days.

The North Birmingham Forge Co., capital stock $20,000, was incorporated here during the past week, and work has already started on erecting a plant. J. H. Minge and associates are the incorporators.

Cleveland. Aug. 8.

Iron Ore.—The movement of ore during the month of July was 5,220,000 tons from the head of the lakes. The new record was the direct result of better despatch at the lower lake ports. This is being continued, and, in addition, there is a little freer use of wild tonnage, which argues in favor of a heavier movement during this month. Rates remain at 75c. from Duluth, with other rates in proportion. There is a little talk of ore sales with prices holding at $3.75 for bessemer Old Range, $3.50 for bessemer Mesabi; $3.25 for non-bessemer Old Range, and $3 for non-bessemer Mesabi.

Pig Iron.—Buying of foundry iron has been the feature of the week, prices holding on spot shipment between $14 and $14.50, with most of the business done at $14.25. The tonnage has amounted to about 10,000 tons. Some furnaces, which are comfortably filled, are holding for $14.75 @$15 on advance delivery for No. 2 in the Valley. Buying of basic and bessemer is slow, but furnaces are holding for $14.50@$15 for advanced delivery, which prices the trade is refusing to pay, resulting in dullness all around.

Finished Material.—Buying of steel bars continues unusually heavy. Orders during the past week amounted to 15,000 tons, with others now pending which will add 10,000 tons. The price holds at 1.50c. Pittsburg for both bessemer and open-hearth. Bar iron is in good demand at 1.60c. Youngstown. Buying by building contractors and by the ship interests of the lakes have added about 12,000 tons to the structural orders on hand, with orders pending from the ship interests for another good block of business, contingent upon deliveries. There is a good demand for steel rails, with one order for 4,000 tons, placed recently, and with other lots coming in. Some mills are charging a premium of $3 for immediate shipment, and have been getting some orders on that basis. The whole market is strong, with sheets the only weak feature, some of the mills making reductions to get business for quick shipment.

Chicago. Aug. 7.

Firmness marks the iron market, though the activity of sales of pig iron has somewhat subsided in the last week. The large buying of pig iron for two or three weeks was based apparently on the needs of the trade rather than on the predicted rush to take advantage of the bottom of the market. Low prices, however, doubtless had much to do with it. At present everything indicates a settled business of more than ordinary volume for August, and the trade expresses confidence that there will be no slipping back from the prices now prevailing, which have not changed since last week, $12 Birmingham or $15.65 Chicago for No. 2 Southern, and $16.50 for Northern.

Orders now being booked are for small quantities, but inquiries are heavy and indicate an increase in the size of individual orders as well as the aggregate business. Two new furnaces are to be constructed in the Chicago district, one at Mayville, Wis., and one at South Chicago.

Trade in finished products is becoming less active, also, but is still good in nearly every line, while railroad business is heavy.

New York. August 9.

Pig Iron.—A larger demand has again developed, and sales in this district show a decided gain over last week. Prices are firm, and some producers are talking of an advance.

For Northern iron in large lots we quote: No. 1 X foundry, $16.25@$16.75; No. 2 X, $15.75@$16.25; No. 2 plain, $15.25@$15.75; gray forge, $14.25@$14.75. Virginia foundry is $16.90 for No. 1 and $16.40 for No. 2. Southern iron is firmer and is now held on a basis of $12.50, Birmingham, for No. 2. For large lots here on dock we quote: No. 1 foundry, $16@$16.50; No. 2 $15.50@$16; No. 3, $15@$15.50; No. 4, $14.50@$15; No. 1 soft, $16@$16.50; No. 2 soft, $15.50@$16; gray forge, $14@$14.50 per ton.

Business on the Produce Exchange is slow. Latest quotations for September and October are $14.80 bid, $15.10 asked for regular warrants; $15 bid, $15.50 asked, for foundry warrants.

Cast Iron Pipe.—Orders indicate a good fall trade, and the makers are all full of work.

Bars.—Bar iron is selling well in a small way. Quotations are firm at 1.645c., large lots on dock. Steel bars are 1.645c. Store trade is fair, with quotations 1.75@2c. delivered.

Structural Material.—Considerable business is noted, mostly in small orders coming to jobbers. Premiums are being asked for early deliveries. Beams under 15-in. are 1.745c. for large lots; over 15-in. 1.845c.; angles and channels, 1.745c., tidewater delivery. Large orders are reported, but they are not closed here, as a rule.

Plates.—Plates are still in demand in small lots. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945.; universal and sheared plates, 1.645c. up, according to width.

Steel Rails.—No change in standard sections. Light rails are quiet, prices ranging from $20.50 for 35-lb., up to $24.50 for 12-lb. rails.

Old Material.—The market is more active, and prices are higher. No. 1 railroad wrought brings around $16.50@$17.50; No. 1 yard wrought, $14.50@$15; machinery cast, $13.50@$14. There is demand for heavy steel melting scrap, and sales are made at $14.50@$15. These prices are on cars, Jersey City, or other terminal delivery. Dealers claim that it is hard to get scrap to fill orders, and are inclined to be stiff on prices.

Philadelphia. Aug. 9.

We have had a typical midsummer week. Nearly everybody is out of town that is worth seeing, and there is nothing to be said by those who are here that throws any light on the situation of pig iron. The tone of the market is strong, and some little buying is being done on local account, but there are no inquiries of moment with reference to future deliveries, and the inquiries which were made two or three weeks ago, and which at that time looked as if they would lead to business, have been dropped, and there is now nothing on the surface to indicate any particular activity this month. Quotations are $17.50 for No. 1 X foundry; $16.75 for No. 2 X; $16 for No. 2 plain; $15 for standard gray forge; $15.50 for basic; southern No. 2 is $16 by rail.

Billets.—Open-hearth billets are quoted strong at $26.50, tidewater.

Bars.—There is an active demand for bar iron, and many of our mills have contracts with car-builders which enable them to run as full time as the weather permits. Quotations are 1.63½ for both refined and steel bars.

Sheets.—Card rates continue at 2.30 to 2.70, and the mills are well supplied with business.

Pipes and Tubes.—The tube consumption keeps up, and the market is very strong.

Plates.—The latest reports from our offices are that a good deal of business is being done in small lots. The explanation is given that large contracts which were to have been filled before this time have not been filled, and that buyers have had to go outside in some instances in order to obtain prompt deliveries.

Structural Material.—The structural mills are working under strain, and the representatives claim that they are keeping all their promises as to deliveries, but it is said on the outside that work here and there has been interrupted somewhat by slow deliveries. Another advance is in sight, on account of the oversold condition and on account of the difficulty of securing billets promptly.

Steel Rails.—Several railroad companies have suddenly appeared in the market, some of them wanting rails for next year's delivery. The estimated quantities run very high.

Old Material.—There is a good deal of uncertainty as to the condition of old material, as some concessions have been unexpectedly made on two or three kinds, including steel scrap and machinery scrap. Railroad scrap is as high as ever, and all that can be had brings $18. No. 1 steel scrap is quoted at $16, and old iron axles are nominally $24. The scrap people are endeavoring to secure options on prospective supplies, in order to be ready for the September demands.

Pittsburg. Aug. 8.

The general tone of the market is further improved, although there continues to be dullness in some lines, particularly tin-plates and merchant pipe. Pig iron is firm, but has not advanced, sales being rather light.

There has been heavy contracting for merchant steel bars, following sales of about 100,000 tons reported last week; the total sales on this movement by all interests aggregate about half a million tons. All this business was done at the regular price of 1.50c., Pittsburg, and it is rather probable that, after all season contracts have been closed, the price will be advanced to 1.60c., perhaps at the end of this year. The contracts placed lately are chiefly by agricultural implement makers and other large users, through this year and, in the case of agricultural interests, through the season, which extends to next June.

The new merchant bar mill built at the Clairton steel works of the Carnegie Steel Co. has been in operation for about two weeks, and is working very well. It has a capacity of about 10,000 tons a month. The company has just started building a structural mill at this plant, which is to be completed by the end of October, and will have a capacity of about 10,000 tons monthly. These two mills will consume about two-thirds of the steel plant's output. A finishing mill of some other description may be added later.

Rail orders continue to come in freely, the only question being one of delivery. It is now certain that a large tonnage will have to be carried over into next year. The light rail mill, to be known as No. 3, at the Edgar Thomson works, will be completed by October, and will increase the production of standard rails, as No. 2 can then be kept on standard sections.

The strike of structural workers just inaugurated against the American Bridge Co. will probably be settled without difficulty. As it refers only to outside workers, it does not seriously affect the Pittsburg district.

Pig Iron.—Sales of bessemer have been very light, and the market cannot be accurately quoted. The two leading sellers are holding out for $14.50, Valley, or $15.35, Pittsburg, but there are some smaller sellers who would sell at 25c. less. It is reported that a good bit of bessemer has been shipped out lately, reducing the stocks of this grade in merchant furnace yards in the Valleys from 100,000 tons to between 60,000 and 75,000 tons. In foundry there have been a number of small sales, running from car-loads to a few hundred tons, at from $14.25 to $14.50, Valley, or $15.10 to $15.35, Pittsburg. There has been some inquiry for gray forge, and one or two 1,000-ton lots have been sold at $14.65@$14.75, Pittsburg, besides a sale of 10,000 tons made recently to one interest.

Steel.—Billets and sheet-bars continue scarce, chiefly because the producers are filled up with business taxing their own finishing mills to the utmost, and leaving a smaller tonnage of steel to be disposed of in the semi-finished form. With the new merchant-bar mill at Clairton in operation, one-third of that plant's billet tonnage is taken care of, while the two rail mills operating at Youngstown also decrease the supply of billets. The inquiries for billets of two leading steel producers, mentioned last week, have been satisfied, one on a scrap conversion basis, while the inquiry for 2,000 tons of small billets by the Republic Iron & Steel Co. was not placed, prices and deliveries named being unsatisfactory, and the company will wait until it can roll the billets itself. Prices are unchanged at $24 for billets, $25 for long sheet-bars and $25.50 for cut sheet-bars; several good contracts have been made at these prices. Merchant steel bars are 1.50c., and plates 1.60c., both prices being firmly maintained.

Sheets.—Demand is rather more unsatisfactory, and there seems to be a little shading. Carloads are quoted at 2.35c. for black and 3.40c. for galvanized, No. 28 gauge. About 60% of the leading interest's sheet capacity is in operation, while independents are running a little more fully than this.

Ferro-manganese.—The market is very quiet, most consumers having bought freely ahead on the recent scare. Carloads and small lots remain at $49@$50, delivered, and large lots at $48, or a trifle less.

Cartagena, Spain. July 22.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that the shipments for the week were one cargo, 3,800 tons manganiferous ore, and one cargo, 3,300 tons, dry ore, all to Great Britain. The loading wharves at Cartagena are to be lengthened, so as to take three steamships at a time, instead of two.

Quotations are unchanged: Ordinary 50% ore is 6s. 4d@6s. 7d.; special low phosphorus, 6s. 10d.@7s. 6d.; specular ore, 58%, 9s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 9s

9d. for 35% iron and 12% manganese, up to 14s. 6d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s., f. o. b. shipping port.

Heavy Chemicals and Minerals.

NEW YORK, Aug. 9.

(For other prices of chemicals and minerals, see large table on page 288.)

The standard heavy chemicals hold about the same on prices, with a strong tone and general anticipation of steady or improving markets. This is particularly the case with nitrate and phosphates.

Acids.—The market continues even and prices unchanged.

Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5 25
Sulphuric acid, 50°, bulk, ton		13.50@14 50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18 00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00

Copper Sulphate.—Price remains at $4.80 for large lots, with slightly more for smaller quantities.

Sulphur and Pyrite.—Prime sulphur (both Louisiana and Sicilian) is quoted in New York, Boston and Portland at $20; in Philadelphia and Baltimore at $20.50. Pyrite continues unchanged at 10@11c. per unit of sulphur for lump ore, with 25c. additional for breaking to furnace size; 9.5@10c. for fines f. o. b. Atlantic ports. Domestic pyrite sells at 11c. per unit for furnace size, and 10c. for fines f. o. b. shipping point. Market even, with no stocks accumulated.

Nitrate of Soda.—Spot is quoted at $2.22½@$2.17½ for this year; and at $2.07½@2.12½ for next year. The market in general is the same, with freights firmer.

Sulphate of Ammonia.—Gas liquor is quoted at $3.10@$3.15 per 100 lb., with slightly less for large orders.

Phosphates.—Prices hold about the same, with no change in prospect.

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Aug. 9.

Gold and Silver Exports and Imports.

At all United States Ports in June and Year.

Metal.	June.		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$1,522,544	$4,030,882	$68,449,393	$39,831,590
Imp	4,886,233	2,137,952	43,713,716	16,598,354
Exc	I. $3,363,689	E. $1,892,930	E.$26,685,667	E. 23,233,236
Silv. Exp	4,410,634	4,744.625	26.367,699	25,081,266
Imp	2,752,401	2,301,596	13,775,600	15,118,941
Exc	E. $1,658 233	E. $2,443,029	E.$12,592,099	$9.962,325

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending August 5, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$7 000	$97,113	$571,030	$43,803
1905	7,926,943	942,558	19,051,714	2,317,316
1904	63,733,262	3,652,656	24,308,579	591,744
1903	2,161,549	3,613,399	12,240,652	1,254,294

Imports of gold and silver for the week were from South America and Mexico. Exports of gold went to the West Indies; of silver, to London.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 5 gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$1,095,476,900	$1,146,163,700
Deposits	1,204,213,400	1,197,126,300
Circulation	38,641,500	49,490,300
Specie	273,168,200	222,104,300
Legal tenders	84,194,000	89,340,800
Total reserve	$357,362.200	$311,445,100
Legal requirements	301,053,350	299,281,575
Balance surplus	$56,308,850	$12,163,525

Changes for the week this year were increases of $1,316,300 in loans and $685,700 in circulation; decreases of $2,726,400 in specie, $1,010,700 in legal tenders, $2,618,600 in deposits and $3,142,450 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$222,104,300	.....
England	184,420,775	.....
France	587,278,765	$221,935,120
Germany	180,165,000	60,055,000
Spain	74,400,000	112,435,000
Netherlands	32,075,500	31,226,000
Belgium	15,650,000	7,875,000
Italy	122,670,000	16,522,000
Russia	548 910,000	29,235,000
Austria	234,035,000	61,800,000

The returns of the Associated Banks of New York are of date Aug. 5 and the others Aug. 3. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to July 27 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£6,019,638	£3,936,341	D. £2,083,297
China	372,722	749,394	I. 376,672
Straits	58,103	2,800	D. 55,303
Totals	£6,450,463	£4,688,535	D. £1,761,928

Imports for the week were £100,000 from New York, £6,000 from Australia, and £9,000 from the West Indies; a total of £115,000. Exports were £58,200 to India and £61,600 to China; £119,800 in all.

Indian exchange is stronger, although money is reported plentiful in that country. Apparently the Indian banks are accumulating money in anticipation of the issue of the new rupee loan. The Council bills offered in London were all taken at an average of 16.03d. per rupee. The demand for silver for India has been light.

The Treasury Department's estimate of the amount and kinds of money in the United States on Aug. 1 is as follows:

	In Treasury.	In Circulation.
Gold Coin (including bullion in Treasury)	$199,398,794	$650,616,580
Gold Certificates	24,974,090	493,437,879
Silver Dollars	19,302,319	73,586,898
Silver Certificates	7,631,049	458,518,951
Subsidiary Silver	13,070,177	101,437,759
Treasury Notes of 1890	41,425	9,123,575
United States Notes	15,249,241	331,431,775
Currency Certificates	.....	.....
National Bank Notes	17,222,511	486,748,884
Total	$296,889,606	$2,604 902,301

Population of the United States Aug. 1, 1905, estimated at 83,259,000; circulation per capita, $31.29. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the government. This statement of money held in the Treasury as assets of the government does not include deposits of public money in national bank depositaries, to the credit of the Treasurer of the United States, and amounting to $57,042,009. The total amount in circulation show an increase of $8,185,830, as compared with July 1, 1905; and an increase of $58,312,798, as compared with Aug. 1 of last year.

A better inquiry for silver on Indian bazaar account, together with good demand for the Continent, has resulted in higher prices for silver in London. The market closes steady.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.45½	$0.47½
Peruvian soles and Chilean pesos	.42	.45
Victoria sovereigns	4.86	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

SILVER AND STERLING EXCHANGE.

August.	Sterling Exchange.	Silver New York, Cents.	Silver London, Pence.	August.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
3	4.86 3/16	59 1/16	27 1/16	7	4.86 1/2	59 1/16	.....
4	4.86 3/16	59 1/16	27 1/16	8	4.86 1/16	59 1/16	27 1/16
5	4.86 1/16	59 1/16	27 1/16	9	4.86 1/16	59 3/16	27 3/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

Other Metals.

Daily Prices of Metals in New York.

August.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
3	15 1/2 @15 5/8	15 1/2 @15 5/8	68 1/4	32 3/4	4.60	5.65 @5.70	5.50 @5.55
4	15 1/2 @15 5/8	15 1/2 @15 5/8	68 1/2	32 3/4	4.60	5.65 @5.70	5.50 @5.55
5	15 1/2 @15 5/8	15 1/2 @15 5/8	....	32 3/4	4.60	5.65 @5.70	5.50 @5.55
7	15 1/2 @15 5/8	15 1/2 @15 5/8	....	32 3/4	4.60	5.65 @5.70	5.50 @5.55
8	15 1/2 @15 5/8	15 1/2 @15 5/8	68 1/4	32 3/4	4.60	5.65 @5.70	5.50 @5.55
9	15 1/2 @15 5/8	15 1/2 @15 5/8	69	@32 7/8	4.60	5.65 @5.70	5.50 @5.55

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.25c. below that of electrolytic.

Copper.—The market has again shown a great deal of strength, and a good business has been doing both for domestic consumption and export. Supplies in the hands of producers and dealers for the next few months are so small that the maintenance of the present level of prices is assured far ahead. The market closes at 15½@15⅝c. for Lake copper; 15⅜@15½c. for electrolytic in ingots, cakes and wire bars, 15⅛@15¼c. in cathodes; 15@15¼c. for casting copper.

The standard market has been rather uninteresting, fluctuations being narrow and business rather restricted. The close is steady at £69 for spot, $68 17s 6d for three months.

Statistics for the second half of July show a decrease in the visible supplies of 300 tons.

Refined and manufactured sorts we quote: English tough, £71@£71 10s.; best selected, £73@£73 10s.; strong sheets, £79; India sheets, £75; yellow metal, 6¾d.

Copper exports from New York for the week ending Aug. 7 were 3,950 tons. Our special correspondent reports exports from Baltimore for the week at 1,582 long tons.

Tin.—The market has been dragging throughout the week, and the tendency to realize by speculators abroad has driven prices down £148 7s. 6d. for spot, £147 for three months.

Business here has been of retail proportions, quotations varying between 32⅝@32⅞c., depending upon deliveries.

Lead.—There is no change in conditions as last reported. Prices remain at 4.52½c. St. Louis, 4.60c. New York.

The London market is very quiet and closes at £13 17s. 6d. for Spanish lead, £14 for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is strong but quiet. The nominal value is 4.55@4.60c., East St. Louis.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 22, that silver has been 14.25 reales per ounce; exchange, 33.35 pesetas to £1. Pig lead has sold at 74.25 reales per quintal, equal, on current exchange, to £12 9s. per long ton, f. o. b. Cartagena. Shipments for the week were 1,129 tons argentiferous lead to London; 700 tons desilverized to Amsterdam; 247 tons argentiferous and 65 tons desilverized lead to Marseilles.

Spelter.—The latest information from Joplin indicates that the situation there is much more serious than at first reported. The production of ore is very short, and the smelters have not been able to get an adequate supply, even at the higher prices which are ruling. On this account a number of furnaces are on dead fire, so that the present spelter production is somewhat curtailed. Consumption, on the other hand, continues at a very good rate, and the aforesaid conditions have, necessarily, resulted in a further advance in the price of the metal. The market closes firm at 5.65@5.70c. New York, 5.50@5.55c. St. Louis.

The foreign market is also higher, quotations at the close being cabled as £24 7s. 6d. for good ordinaries, £24 12s. 6d. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is unsettled. Latest prices are 5.60@5.65c. East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 22, that prices are unchanged, 75 fr. being asked for blende, 35% zinc, and 55 fr. for calamine, 30% zinc. Shipments for the week were 1,400 tons blende to Antwerp.

Silesian Spelter Market.—Paul Speier writes from Breslau, under date of Aug. 1, that the market is steady, with a strong feeling. Prices are 24.60@24.85 marks per 50 kg., f. o. b. Breslau. This is equal to an average of 5.34c. per lb. The output in Silesia for six months is about 3,350 tons over the average for four years past.

Zinc dust is quiet, and prices unchanged, though more inquiry from abroad is reported.

Exports and imports of spelter in Germany for the half-year ending June 30 were as follows, in metric tons:

	1904.	1905.	Changes
Spelter	32,420	30,520	D. 1,900
Zinc sheets, etc	8,243	8,583	I. 340
Scrap, etc	2,067	2,185	I. 118
Total exports	42,730	41,288	D. 1,442
Imports	11,172	14,739	I. 3,567
Net exports	31,558	26,549	D. 5,009

Imports of zinc ores were 43,946 tons in 1904, and 60,861 tons in 1905; an increase of 16,915 tons. Exports of zinc white were 9,086 tons in 1904, and 8,954 tons in 1905; a decrease of 132 tons.

Antimony.—There is no change in the quotations, which are 13½@14½c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Manganese Alloys.—Prices for manganese alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks
Manganese Copper, No. 1, 30% Mn	265
No. 2, 28% Mn	175
No. 3, 20 to 25%	165
Manganese Tin, No. 1, 55% Mn., no iron	365
No. 2, 55% Mn., some iron	225
Manganese Nickel, No. 1, free of iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are, f.o.b. works:

Aluminum.	Per lb.
No. 1 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.00
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$2.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

Quicksilver.—Quicksilver is unchanged; large quantities can be had at $40.50 per flask; small orders are placed at $41@

$41.50. San Francisco prices are unchanged, $39 being asked for domestic orders. Export business can be placed at $37.50@$38 per flask. The London price is steady at £7 7s. 6d. per flask, from both first hands and jobbers.

Missouri Ore Market.

JOPLIN, Aug. 5.

The highest price reported paid for zinc ore was $56 per ton for one bin at Duenwag, $55.50 for one bin in Carterville and two bins in Joplin. This is an advance of $4.50 to $5 per ton—$4.50 on the Joplin product, $5 on the Carterville and $6 on the Duenweg product. Absolutely no observation was given the assay basis; each buyer, when asked concerning a basis, replied that he knew nothing of any basis, that he paid what was necessary to secure the ore, and that was all there was to it. The purchasing this week was all done in one day. No ore was sold until Thursday morning, and the canvass of the district by the buyers was so close that no ore was left to purchase after Thursday evening. Buyers unite in pronouncing it the most severe test ever given them in one day. Each buyer had his orders for a certain tonnage, and each one knew there was not enough ore for all, owing to the very limited output; consequently, it was up to the one who could cover the most territory in the least time to get his full supply. Imperative shipping orders also accompanied the order to buy. With a scarcity of cars, owing to the movement of grain, another problem was added to that of purchasing a specified tonnage, when there was not enough ore to meet the demand. One buyer was reported to have dumped a wagon load of ore on each of 15 cars, and in this way succeeded in getting nearly as many cars as he wanted. Others who had secured a fair share of ore, could get no cars until very late in the week, and this made Saturday loading unusually large. But with the scramble for ore and for cars, the shipment was one of the smallest of the year, only four weeks during the severe winter showing less tonnage. The floods of July 21 and 28 have subsided, but the mines that were filled to the surface have not yet begun the campaign of active pumping, while practically every mine in the district has had to install additional pumps.

The shipment was 417 tons below the average for the seven months of the year. The shipment the five weeks preceding the flood averaged over 5,200 tons, and the output in June was growing toward a possible 5,600 tons per week. The shipment of 4,380 tons last week represents approximately the output, and there is little prospect that this will be materially increased under three or four weeks. Not only producing mines were flooded, but mines that would have been in the shipping class, some in a week and others within a month, met with like disaster.

Following are the shipments of zinc and lead from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,570,640	254,000	$74,460
Carterville-Webb City	1,477,630	596,670	54,100
Galena-Empire	872,180	80,960	23,360
Duenweg	745,040	150,110	22,650
Aurora	1,008,090	.....	21,510
Neck City	426,420	.....	11,080
Oronogo	385,720	36,710	8,880
Alba	273,110	.....	7,100
Baxter Springs	170,640	71,390	5,170
Granby	277,000	31 000	5,055
Prosperity	142,909	40,190	4,610
Carthage	191,560	.....	4,020
Badger	63,740	.....	1,650
Sherwood	47,540	6,430	1,320
Belt Branch	69,080	12,530	1,290
Zincite	41,130	.....	1,030
Totals	8,762,420	1,269,990	$247,295
31 weeks	296,678,250	36,112,340	7,657,335

Zinc value, the week, $209,352; 31 weeks, $6,605,430
Lead value, the week, $ 37,940; 31 weeks, $1,051,905

The average prices for zinc ore for the week were $47.79; for the year, $43.85 per ton. For lead ore the average was $59.75 per ton for the week, and $58.26 for the year.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00

Mining Stocks.

New York. Aug. 9.

The copper shares have been quite a feature this week, both on the Exchange and in the curb market. Amalgamated closes a shade off, but other stocks are strong, notably United Copper, Granby and Greene Consolidated.

In other mining stocks, not much was done. Tonopah, of Nevada, brought $14 @$14.50, with several sales. Homestake was $77 bid and $79 asked, with no sales reported.

On the Consolidated Exchange some stocks not often quoted came out. Sales were made of Mollie Gibson at 5½c. and Work at 9½c. Sandstorm (Nevada) was dealt in at 58c., and Elkton (Colorado) at 43@44c. Of the Comstocks, Consolidated California & Virginia brought $1.25@$1.30; Mexican, $1.35; Ophir, $7.25@$7.37½. These generally show advances.

The industrial stocks led in the market, United States Steel showing large transactions. Nearly all were stronger.

Boston. Aug. 8.

Speculation in mining shares has been dampened by the continued selling of Copper Range Consolidated. This may be desirable in view of the rapidity with which stocks have advanced the past few weeks. It would seem as if the climax was about to be reached in this stock, as history is making fast. The selling has all come from one source, and has been persistent and in large lots. It is estimated that one house has sold from 150,000 to 200,000 shares since the movement began two weeks ago, and to-day this house found itself in very uncomfortable quarters, as some of the stock offered for transfer was not accepted, which put the firm in a bad hole, as the stock immediately rallied $4, to $72.75. Wednesday last it sold at $71.50 and gradually it wore away to $68.75. The mystery has not yet been solved, as to who the real sellers are, while the street has been full of rumors. All told, Lawson has been the principal, and the stock that was refused transfer was certain stock that was pooled two years ago when the Trimountain property was taken over by Copper Range. How it got out has yet to be explained, and possibly the courts may have to settle the case.

Allouez had the nominal rise of $4.87½, to $35.37½. It closed $1.75 below this today. The mill run by the Centennial shows that the Allouez rock ran 2.26%, or 45.2 lb. of mineral to the ton of rock, which is fully up to expectations. Centennial was well bought up to $23.87½, yielding a fraction from this. The Lake people were said to be prominent buyers. Speculation in Tecumseh has subsided and the price is off $1, to $6.87½. Isle Royale is off $2, to $21.50 for lack of support; that is all. Greene is off $1.25 for the week, to $24.75. It is said that several thousand shares of this stock are held by Boston houses, which are registered in New York only. There are about 5,200 stockholders, and about 198,000 shares stand in names of Boston people.

Mohawk spurted to $55.75 on comparatively light dealings, closing $1.25 better than a week ago, at $54.75. United Copper is off $1.25, to $32.25 on lack of trading. This company is said to have struck a rich body of ore in the Belmont mine. United States rose to $34.50, but is off tonight to $33.37½. Wolverine touched $120, on the annual report, which shows surplus earnings of $201,334 for the year ended June 30 last. The bulk of Wolverine is owned in the Lake district. Mass has lost 75c. during the week, to $9. Michigan 62½c., to $14, Old Dominion $4, to $28, Winona 50c., to $12.50 and Osceola $1.75, to $99.75.

The Boston Consolidated is offering £250,000 in 6% debenture bonds to stockholders of record August 14 who can subscribe at the rate of $48.70 for each £10 bond. The Shannon Copper Co. has retired $60,000 more 6% bonds, leaving $420,200 of the original $600,000 out.

Colorado Springs. Aug. 4.

The local market has remained in the same quiet condition and very few Cripple Creek stocks have developed any activity. The output of the Cripple Creek district

for the month of July exceeded June by nearly $100,000, amounting to $1,817,570. The total output for the seven months of this year amounts to $12,676,265. Stratton's Independence mine has just renewed all leases expiring, considering the leasing system advantageous to the company. This company is producing nearly as much as in its most prosperous years.

Elkton is selling lightly at 42c. El Paso remains $1.23@$1.25. Findley is selling for 63c.; Portland at $2.25; Gold Sovereign at 10c.; Jerry Johnson at 16c; Isabella at 28½c. per share.

San Francisco. Aug. 3.

Ophir climbed up to $7.50 early in the week, but dropped to $7.25 later. It held firmly about that point, however, and the rest of the Comstocks were generally pretty steady. The transactions were not very large, as a rule. The Silver Hill and middle Comstocks were most in demand, North End shares being rather neglected. Consolidated California & Virginia closed at $1.35; Best & Belcher, $1.30; while Hale & Norcross, at $1.95, closed rather weak.

Business in the Tonopah stocks tended towards quiet, but the prices gave way only to a slight extent. Montana Tonopah sold at $3; Tonopah Midway, $1.50@$1.55; West End, $1.05; Jim Butler, 73c.; Sandstorm, 61c.; Original Bullfrog, 26c. per share.

Oil stocks continue dull. Oil City brought 59c.; Independence, 26c., on small sales.

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper	Aug. 28	1.25	1,933,750
B. & H.	July 31	0.01	4,000
Bunker Hill & Sullivan	Aug. 4	0.50	150,000
Cambria Steel Co.	Aug. 15	0.75	675,000
Empire Zinc	Aug 5	0.10	5,000
N. Y. & Hond. Rosario	Aug. 26	0.15	15,000
Pressed Steel Car, pfd.	Aug. 29	1.75	218,750
Quincy, copper	Aug. 24	3.00	300,000
Tonopah, of Nev.	Aug. 22	0 25	250,000
U. S. Cast Iron Pipe & Fdy. pfd.	Sept. 1	1.75	218,750
U. S. Steel, pfd	Aug. 30	1.75	6,304,919

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

St. Louis. Aug. 6.

	High.	Low.
American Nettie	.25	.10
Center Creek	$2.00	$1.50
Central Coal & Coke	64.00	63.00
" " " pfd.	79.00	77.00
Central Lead	155.00	150.00
Columbia	1.00	.25
Con. Coal	30.00	29.00
Doe Run	126.00	120 00
Granite Bimetallic	.35	.27
St. Joe	16.50	15.00

LONDON. (*By Cable.**) Aug. 9.

	£	s.	d.
Camp Bird	1	15	0
Consolidated Gold Fields	6	7	6
De Beers	17	0	0
Dolores	1	12	0
East Rand	7	13	1½
El Oro	1	2	9
Esperanza	2	5	6
Modderfontein	9	1	3
Rand Mines	9	7	6
Rio Tinto	67	5	0
Simmer and Jacks	1	13	1½
Tomboy	1	2	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

WEEK ENDING AUG. 9.

NEW YORK.

Name of Company.	High	Low	Clg.	Sales
Amalgamated	84⅝	83⅜	82⅞	97,575
Anaconda	116	115	115½	3,400
Arizona Consolidated	30⅜	30¼	30⅜	1,500
British Col. Copper	7⅜	7⅜	7⅜	10,860
Federal Min. & Smelt.	114	110	113	750
Federal Preferred	95½	94	95	9,800
Greene Copper	26⅜	24⅝	24⅞	48,300
Greene Gold	4⅜	4¼	4⅜	21,400
Mitchell	6⅜	6⅜	6½	12,900
Tennessee Copper	30⅜	29⅜	30	600
Union Copper	1⅜	1⅜	1 1/16	3,725
United Copper,	34⅛	32⅛	32⅛	27,800
United Copper, Pref.	78½	77⅝	77½	1,410

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	128	124	126½	172,300
Am. Smelting & Ref., Pf.	123½	122½	122⅝	9,200
Colorado Fuel & Iron	47	45⅜	46	10,960
National Lead	48½	46⅜	46⅜	41,250
National Lead, Pf.	105⅜	105	105⅛	500
Pittsburg Coal	15⅜	13½	14⅜	3,700
Pittsburg Coal, Pf.	57½	50⅝	54⅜	2,600
Republic I. & S.	22½	21	21½	24,600
Republic I. & S., Pf.	87⅝	83	86	29,650
Tenn. Coal & Iron	91	88½	90½	24,500
U. S. Steel	36⅜	34½	35⅛	186,600
U. S. Steel, Pf.	105	103⅜	103½	139,820

BOSTON.

Allouez	35	29⅞	33¾	16,768
Amalgamated	84¾	83⅛	84	7,430
Atlantic	18⅜	18	18¼	1,725
Bingham	31½	31	31¼	1,330
Boston Consolidated	8⅜	8	8⅛	5,486
Calumet & Hecla	675	675	675	15
†Centennial	23⅛	22¼	23	8,539
Mercur	.60	.58	.59	1,425
Copper Range	72¾	68¾	68¾	77,922
Daly-West	14⅞	14	14	1,030
Franklin	13	12½	12½	3,049
Granby	7½	7¼	7¾	2,800
Green Con. Copper	26¼	23⅞	24¾	1,150
Isle Royale	22¾	21	21	1,825
‡Mass	9⅞	9	9	475
Michigan	15	14	14¼	1,219
Mohawk	55¾	53	54½	5,185
Old Dominion	28¾	28	28	120
*Osceola	101¼	98¾	99½	790
Parrot	26½	25½	25½	20
Phoenix	2.01	1.00	....	225
Quincy	105	103	103	118
Shannon	7⅞	7½	7⅞	1,274
*Tamarack	126	123	123	50
Tecumseh	8¼	6¾	6⅞	6,441
Trinity	8⅞	8¼	8¼	475
United Copper, com.	34	31⅞	31⅞	5,661
*§United States	34¾	33⅛	33⅜	10,099
*Utah	46¼	45⅞	45⅞	620
Wolverine	120	118	119½	501

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §Ex. Rights.

BALTIMORE.

Alabama C. & I.	60	60	60	20
Consolidation Coal				
Georges Creek C. & I.				

PHILADELPHIA.

Cambria Steel	27½	27	27	1,904
Philadelphia Co.	47	44⅞	46½	32,699
Tonopah	14⅜	14	14¼	2,228

PITTSBURG.

Crucible Steel	13	11¼	12⅝	5,190
Crucible Steel, Pref.	65	63	64½	2,148
O. Tonopah	35	30	31	5,125

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	40	43½	40	43½
El Paso	125	125	119	119
Portland	210	225	210	225
Vindicator	80	80	80	80

SAN FRANCISCO.

Best & Belcher	1.30	1.30	1.25	1.25
Bullion	.40	.41	.39	.39
Caledonia	.46	.47	.43	.43
Confidence	.93	.93	.90	.92
Con. Cal. & Va	1.30	1.35	1.30	1.30
Hale & Norcross	1.80	1.85	1.80	1.80
Mexican	1.30	1.35	1.30	1.35
Occidental Con	.87	.87	.87	.87
Ophir	7.00	7.12½	7.00	7.12
Savage	.68	.64	.66	.64

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12 553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	.....	12.468	.....	56.952	.....
Sept.	12.495	.....	12.620	.....	57.645	.....
Oct	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	.....
Mar.	28.317	29.523	Sept.	27.780	.....
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	.....
Mar	4.475	4.470	Sept.	4.200	.....
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	.....	4.716	.....	.....
September	5.046	.....	4.896	.....	.....
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa,, flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01⅝
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.05½@.05⅞
Lump	"	.09⅛
ARSENIC—White	"	.02¾@.03
Red	"	.06¾@.06⅞
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	28.00@29.00
Powdered 80@90%	lb.	.01¾@.02
Chloride com'l	100 lb.	1.35@1.50
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg. "	5 00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BONE ASH	100 lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.30
Acetate, brown	"	1.55
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 400 lb.	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.80
Slag cement	"	.75@1.25
CHLORINE—Liquid,		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	7.75@8.00
Am. best ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best	"	16.75
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.52½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11@.11½
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20 00@30.00
Imported	"	30.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill,	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
Am. pulverized	"	45.00
Best flake	"	150.00
Ceylon, common pulv	"	.02¾@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l.	lb.	.01¾
Sulphate	100 lb.	.50@1.25
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.08½@.08⅝
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01⅞
Paris green, pure, bulk	"	.12
Red lead American	"	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.05½
American, in oil	"	.06½@.06⅝
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04⅝@.04⅞
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am.	"	.08½@.084
Scotch	"	.08⅝@.08¾
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08½@.08¾
Cyanide (98@99%)	"	.18@.19
Kainit (bulk)	lg. ton.	8.50
Manure salt 20%	"	14.75@15.75
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	"	1.90@1.95
Permanganate	lb.	.09½@.09¾
Prussiate, yellow	"	.13½@.13¾
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.00@4.25
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36½
SODIUM—		
Acetate	lb.	0.04⅛
Bicarb., ord., bulk, f.o.b. works		1.30
works	100 lb.	3.50
Extra domes, f.o.b. works	"	.06¾
Bichromate	lb.	.20
Bromide	"	
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.08½@.08½
Hyposulphite, Am.	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02½
Prussiate	"	.09¼@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.85
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Best seconds, per ton,		21.00
Roll	lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—North Carolina	sh. ton.	15.50@23.50
N. Y Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Crystals	lb.	.22
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09⅞
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Nitrate	"	12.00
DIDYMIUM—Nitrate	"	45.00
ERBIUM—Nitrate	"	67.50
GLUCINUM—Nitrate	"	13.50
LANTHANUM—Nitrate	"	56.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.